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# FLYING

THE WORLD'S MOST WIDELY READ AVIATION MAGAZINE

JUNE, 1956
35 CENTS
In U.S. and Canada

CESSNA 180
ON TRAPPER LAKE, WASHINGTON

"An Antique Plane Tests a Modern Pilot"

BY PETER M. BOWERS

GLOBAL SEARCH FOR KNOWLEDGE—

"The International Geophysical Year"

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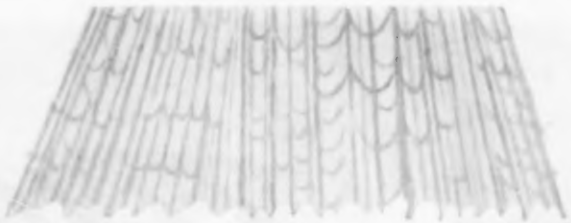

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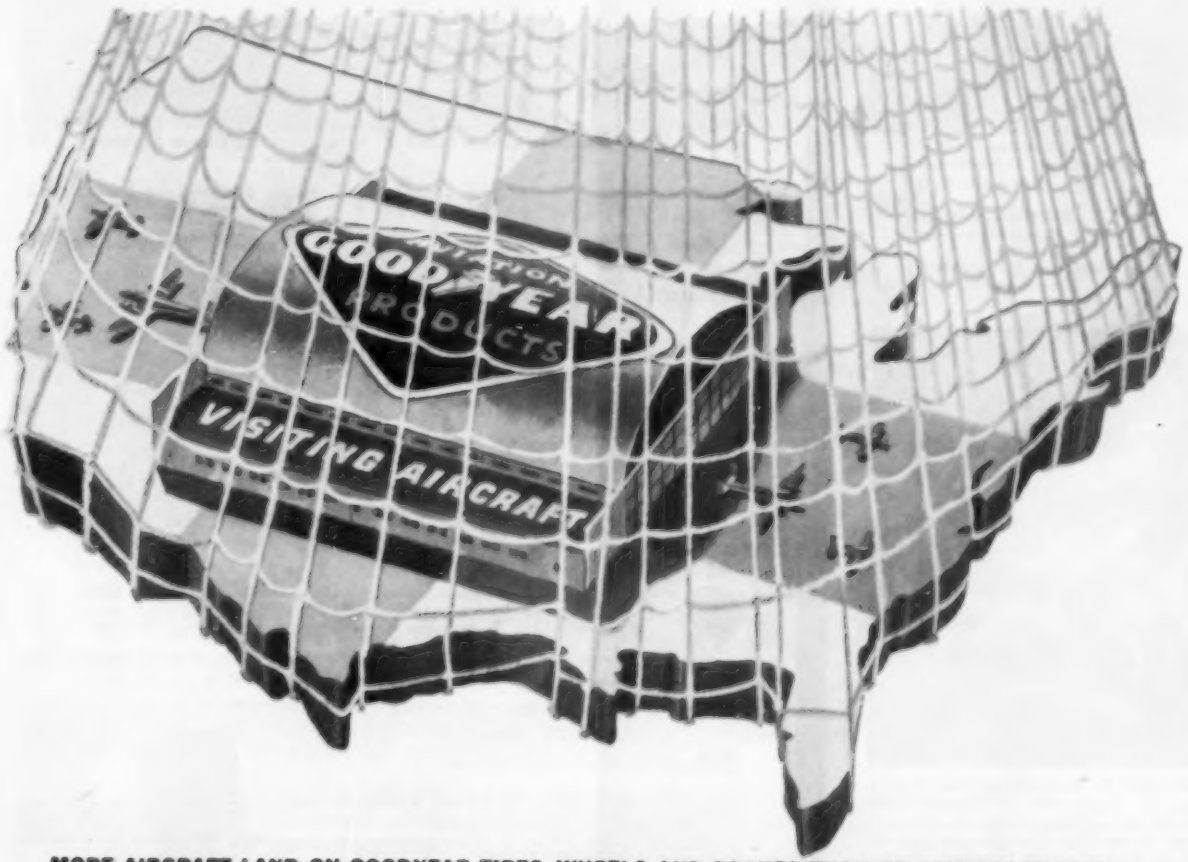


**MORE AIRCRAFT LAND ON GOODYEAR TIRES, WHEELS AND BRAKES THAN ON ANY OTHER KIND**

JUNE, 1956 VOLUME 58, NUMBER 6

# FLYING

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**THE COVER:** Ernie Gibson fishes from a float of Cessna 180 on Trapper Lake, which can only be reached by plane or trail, in the Chelon Wilderness area of Washington's Cascade Mountains. Photograph by Ray Atkeson of Portland, Ore.

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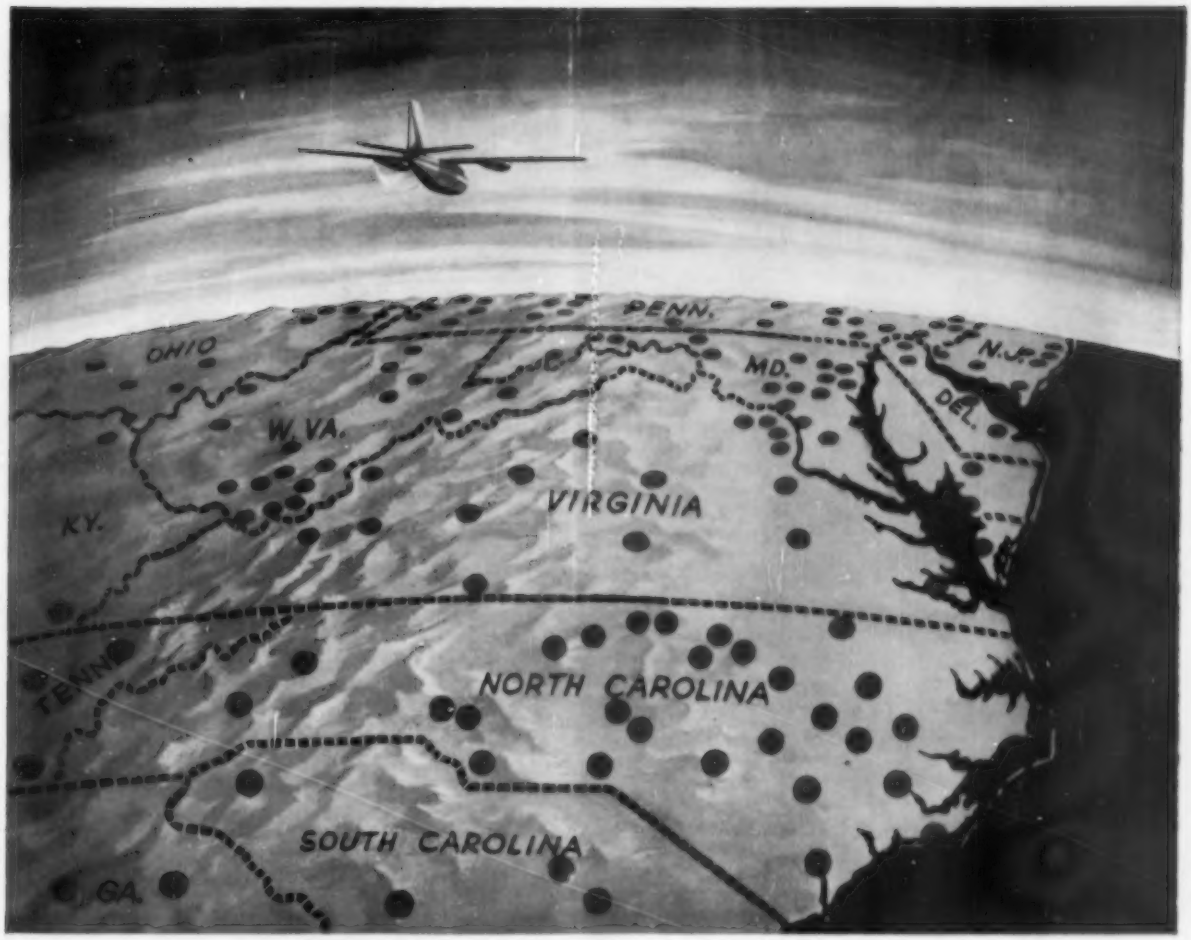


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# MAILBOX

### A CONTROLLER SPEAKS

I would like to take this opportunity to thank FLYING Magazine and Don Emerson for the very interesting article, "I Learned About Flying from That," in your April issue.

During the last four years I have worked all types of air traffic control utilized by the military as well as CAA. During that time I have run across only too many small aircraft pilots who seem to be under the impression that ATC and all the helpful facilities are only for the other guy . . . or especially for military or airline pilots . . . We do our best to educate these poor unfortunates but our progress is slightly better than nil.

. . . Here is hoping that you might find it possible to explain to the private pilot the many facilities at his disposal . . . that we are standing by to "sweat out" their problems right beside them 24 hours a day . . . that we fully understand the problems encountered in flight and are equipped with the means and experience to foresee and to dispense with a pilot's problems even before they are encountered.

KENNETH W. COUTTS
Shift Supervisor
Westover Rapcon
Westover AFB, Mass.

### THE AFTER FIVE CLUB

On behalf of the officers and members of the Goodyear Wingfoot Fliers Inc., I would like to express our sincere appreciation for the fine article about our club in the March issue of FLYING. It has been received here with a great amount of interest and favorable comment. We of the Wingfoot Fliers are pleased to see our phase of Goodyear's continuing policy of "Keeping America First in the Air," given such good publicity.

To keep you up to date, we are happy to announce the addition, in March, of our 7th airplane, a beautiful new Cessna 172.

JOHN S. FLEUGEL
Wingfoot Fliers, Inc.
Akron, O.

### WHEAT OR MICE?

I have just picked up my April copy of FLYING and had gotten to page 8 when I saw the picture and letter from Ed Allison, Alberta, Canada.

Please believe me that I don't grab up a typewriter every time I see something I don't agree with . . . but somebody should tell Mr. Allison that if the plane he has hangared between 2,000 bushels of wheat is a J-3 *Cub*, then it has ribbon stitching and that wheat is going to attract a herd of mice, and that herd of mice is going to be making nice nests out of the stitching . . . Somebody better tell him or he is going to have a very unpleasant and costly surprise when he finds the rib stitching gone!

If you like him well enough to print his picture and letter, then surely you like him well enough to tell him to get that *Cub* out of there—or sell the wheat.

M. P. SCHRANK
Jordan, Montana.

● *Guess it's a case of which you want least . . . wheat storage or mice in your wings.*—ED.

### SQUADRON HISTORY

Would you kindly let your readers know that the history of No. 210 Squadron RAF, formerly No. 10 Squadron RNAS, is now being compiled from official records, but that any personal recollections, anecdotes, or photographs available from other sources would be much appreciated.

The official records of the squadron during the first World War and for the period 1st February, 1920 to 1st April 1923 are very scanty and any information about these two periods would be particularly welcome.

Any material supplied should be sent to the Officer Commanding, No. 210 Squadron, Royal Air Force, Topcliffe, Thirsk, Yorks., England, and will be returned if requested.

WING COM. J. L. NUNN
Thirsk, England

### NASSAU JAUNT

Enjoyed your article on the Nassau Jaunt. (April, FLYING). We made the trip in our Stinson 165 in February 1955. Our first stop was Cuba. We left Punta Alegre, Cuba for Nassau some 200 miles over water. It took us 2 hours and 15 minutes. Enjoyed the stay in Nassau even though customs charged us $14 because Princess Margaret was on the Island.

We developed magneto trouble when we left for Miami, just west of Bimini, so we turned back and landed on the beach at Bimini for repairs.

Besides my husband and myself we had our 3-week-old baby daughter and a friend along. Our equipment was a complete instrument panel, a loaded 55-gal. auxiliary tank, Mae Wests, camping gear and 14 disposable diapers.

MRS. WM. J. BANCROFT
Middleton, Wisc.

### TRY THE HIGH ROAD

In the March issue of FLYING the article "Try the High Road" by Ted Durosko gave some helpful pointers to those who frequent the airways on long cross-country trips. However, there is a misleading

*(Continued on page 77)*

# You get all 3 for only $268.50

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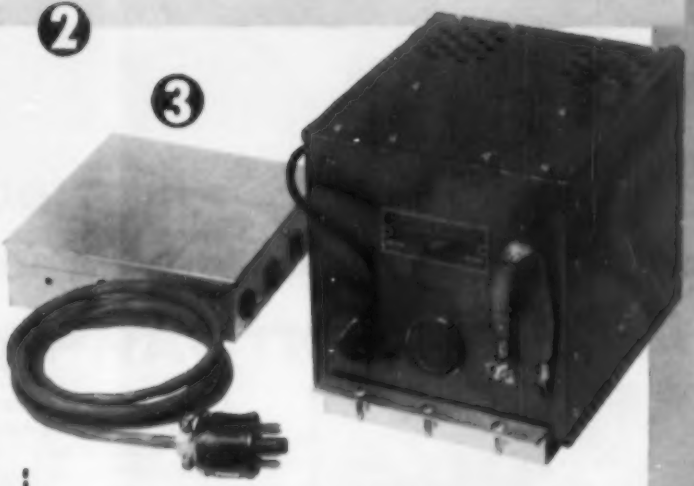

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# Champion-equipped F-100C Super Sabre sets supersonic speed record...822 mph!

*Air Force Officer pilots North American jet to new world speed mark*

**This electronic timer,** used to clock the record run, measures time down to a fantastic 1/100,000th of a second.

**High-altitude scanner** with telescopic viewfinder, specially designed to check on aircraft speed trials.

Flashing through the sky eight miles above California's Mojave Desert, an Air Force North American F-100C Super Sabre streaked to a new official world's speed record . . . a supersonic 822.135 miles per hour. The pilot twice guided the speeding ship over the 11-mile course . . . once at 773.644 mph, and once at an astounding 870.627 mph, for an average speed of 822.135 mph . . . bettering the previous record by more than 70 miles per hour!

The speedy Super Sabres are powered by Pratt & Whitney J-57 turbojet engines delivering over 10,000 pounds thrust. Champion Jet Igniters are original equipment on these engines, as on most leading jets. Champion dependability is important in jet engines, for in case of a "flame-out" the jet igniters must refire the fuel—quickly! Because Champion has an outstanding record for producing a dependable, quality product, leading manufacturers choose Champion to fire the flame that sends their jets flashing through the sky.

Dependability is equally important in piston engines. And for the most dependable spark plugs you can buy for aircraft or auto, get full-firing, long-lasting Champions.

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**SIMPLIFIED CONTROLS** connect rudder and ailerons, let you steer with wheel alone like a car. An exclusive Tri-Pacer feature in its class.

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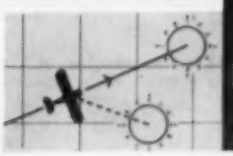
**INHERENT STABILITY.** The Tri-Pacer, with famed Piper wing section, is highly stall resistant, is virtually impossible to spin.



**NEW OMNI NAVIGATION** tells you where you are, gives you an easy-to-follow electronic "track" anywhere you wish to go. So much simpler.

**"LEARN-AS-YOU-TRAVEL"** program, offered by your Piper dealer, lets you make business trips and learn to fly at the same time.

Flying is so safe and practical today that literally tens of thousands of business people, professional men, farmers and ranchers are profitably using and flying their own business airplanes. A decade ago this was not true because available aircraft were either too expensive, too slow, or too hard to fly.

Today, thanks to major improvements in the air and on the ground, it is *practical* for YOU to consider an airplane in your daily affairs . . . helping you build business or opening new family travel opportunities.

Many of these improvements were pioneered with the Piper Tri-Pacer—the first low-cost, four-passenger business plane to offer tricycle landing gear, simplified controls, inherent flight stability and many other features which make flight so safe and simple today. Coupled with greatly improved navigation and communication aids, more and better airports, the Tri-Pacer assures you of clean, convenient, comfortable, economical travel completely free of highway hazards. Yes, today it is *practical* (and safer, too) for you to fly yourself. Let your Piper dealer show you or write for further details.

**PIPER** AIRCRAFT CORPORATION
Lock Haven, Pa.

*Please send me new full-color brochure on 1956 Tri-Pacer plus folder on Piper "Learn-as-You-Travel" plan.*

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## FLYING CALENDAR

**May 25-26**—Third Annual Tucson-Hayward Air Race sponsored by 20-30 Clubs of Tucson and Hayward. All aircraft are due in the Old Pueblo on or before May 25.

**May 27-June 4**—Aviation Writers Ass'n annual convention at San Francisco, Calif., George Rhodes, Chairman.

**May 27**—2d Annual Fly-in Chicken Barb-q of the Goshen (Ind.) Jaycees at Goshen Mun. Airport (4½ mi. south of Goshen bet. U. S. 33 & Ind. 15). Bring your own tie-downs. Rain date: June 3.

**May 30-June 3**—8th Annual Wright Memorial Glider Meet. For information contact: The Soaring Soc. of Dayton, Inc., Far Hills Branch, P. O. Box 581, Dayton 9, Ohio.

**June 2**—7th Annual Maintenance and Operations Meeting, Reading Av'n. Service, Inc., Reading Mun. Airport, Reading, Penna.

**June 8-10**—Missouri Pilots Ass'n., Air Tour. Contact Missouri Av. News, Div. of Resources & Development, Jefferson City, Mo.

**June 9-10**—4th Annual Steak Flight, Ranchaero Airport, Chico, Calif. Sponsors: Butte Cy. Sheriff's Aero Sq. & Chico Sq. #76, CAP.

**June 10**—Quad-City Airman's Ass'n., fly-in breakfast. Contact: Henry A. Zimmer, Quad-City Airman's Ass'n, Quad-City Airport, Moline, Ill. Rain date, June 17.

**June 17**—Second Annual Air Show, sponsored by Post 1920, Veterans of Foreign Wars and Burlington Flying Serv., Inc., Burlington Mun. Airport, Burlington, N. C.

**June 17-22**—Fourth Annual Philadelphia Jaycee Air Cruise from Phoenix, Ariz., to Philadelphia, Pa. George H. Baughman, Chairman, Air Cruise Committee, Jr. Ch. of Commerce, 121 S. Broad St., Philadelphia 7, Pa.

**June 21-22**—Aviation Distributers and Manufacturers 27th annual meeting at Grove Park Inn, Asheville, N. C. Directors and committees meeting June 20.

**June 23, 24**—Porterville Pilots Area Ass'n. 9th Annual Moonlight Flight. Wiener roast, dancing, entertainment free to all who fly in. Lighted field, 5,000' & 6,000' runways, control twr. Write: PAPA, 1110 Mill St., Porterville, Calif.

**June 24**—3d Annual ranch-style, Fly-in Breakfast, sponsored by the Bluffton Flying Club at Bluffton Airport, Bluffton, Ohio.

**July 1**—Annual Grand Haven Dawn Patrol, Grand Haven Memorial Air Park, Grand Haven, Mich.

**July 7-10**—Tenth Annual All-Woman Transcontinental Air Race from San Mateo Cy. Airport, San Carlos, Calif., to Bishop Airport, Flint, Mich. For details, contact: Betty Loufek, Director, Public Relations, AWTAR, Inc., 5316 Carita St., Long Beach 8, Calif.

**July 8-15**—Philadelphia Glider Council annual open house week at Phila. Gliderport, Hilltown, Penna. Soaring Pilots' Flying Vacation—Aero Tows.

**July 21-Aug. 5**—National Soaring Meet of Canada at Cap de la Madeleine, P.Q., under sponsorship of St. Maurice Aero Club (formerly RCAF Aero Club, Inc.).

**July 22**—4th Annual Fly-in Breakfast sponsored by Pottstown unit, AOPA at Pottstown Airport, Limerick, Pa. Rain date: July 29.

**July 28-Aug. 2**—1st National Flying Clubs convention, Seattle, Wash. Washington State Av'n Ass'n. will be host to 600 private planes participating in special events, safety conferences and mass flight over Seattle. For details write: Nat'l Flying Clubs Convention, Box 6, South Annex, Boeing Field, Seattle 8, Wash.

**July 29**—7th Annual Trophy Race, Lunken Airport, Cincinnati, O. Write: Margaret L. Berning, Greater Cincinnati Airmen, Inc., Adm. Bldg., Lunken Airport, Cinti 26, O.

**July 29**—2d annual Air Fair sponsored by Portland (Ore.) Jr. Ch. of Commerce at Portland International Airport.

**July 31-Aug. 9**—23rd National Soaring Contest at Grand Prairie, Tex., sponsored by Texas Soaring Ass'n., under auspices of Soaring Soc. of America.

**Aug. 1-5**—Air Force Association annual convention, New Orleans, La.

**Aug. 3-5**—Fourth Annual Fly-in of the Experimental Aircraft Ass'n., Oshkosh, Wisc. Steve Wittman, host. Write: EAA, 3081 S. 56th St., Milwaukee, Wis.

**Sept. 1-3**—National Aircraft Show sponsored by Oklahoma City Ch. of Com. and the Air Foundation of Cleveland at Will Rogers Field, Oklahoma City, Okla.

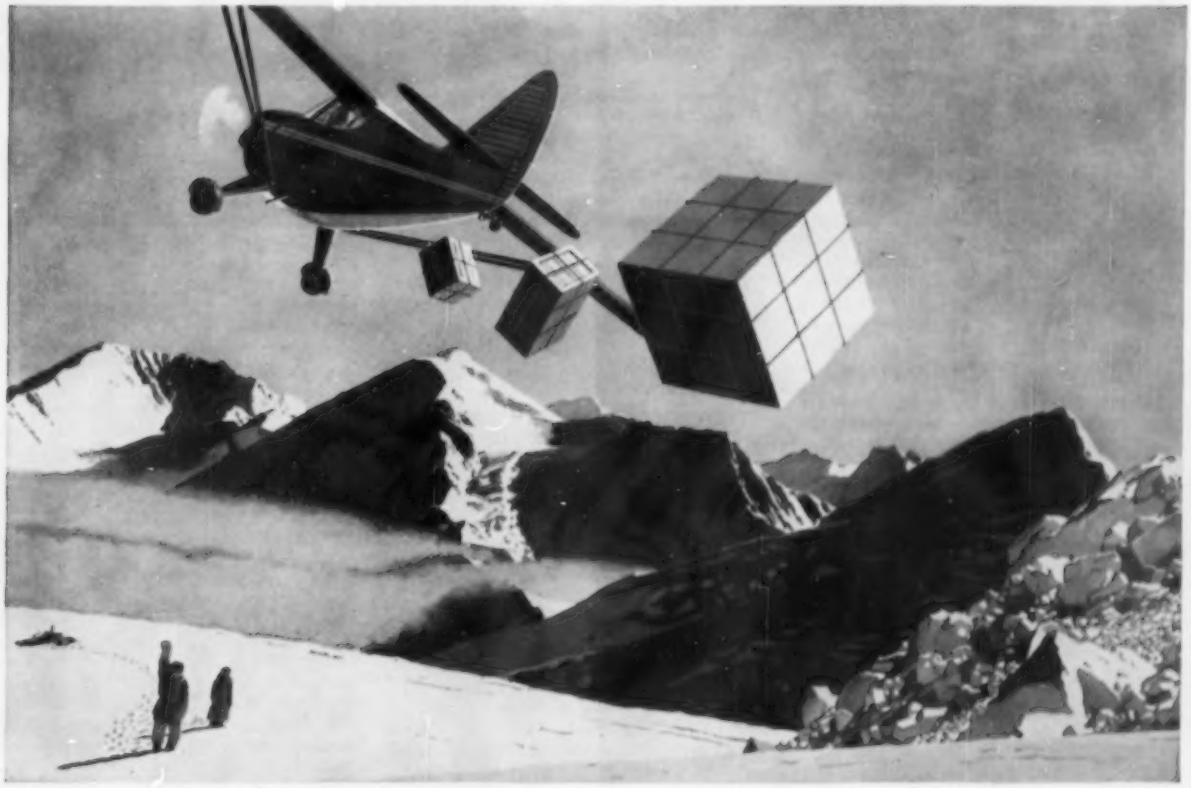
**Sept. 15, 16**—2d Annual Flying Fair sponsored by the Lazy Eight Flying Club at Yuba Cy. Airport, Marysville, Calif.

**Oct. 24-26**—Ninth annual meeting of National Business Aircraft Ass'n, Miami, Fla.

Calendar items must be received at FLYING's editorial offices, 366 Madison Ave., New York 17, N. Y., three months prior to the event.

# PLANE FAX

*by* STANDARD OIL COMPANY OF CALIFORNIA



## Delivering groceries to the Sierra crest

Snowbound in June! Every year from November to the first days of summer, a snow-survey engineer and his wife are isolated in their home high in the mountains south of Lake Tahoe. And each month Max Jones, a grocer of Gardnerville, Nevada, flies over the Sierra Nevada's crest to drop fresh vegetables, meat and mail into the soft snowdrifts piled near their door.

"Much of the trip is low-level flying," says Mr. Jones. "In spite of going over the top at 10,000 feet I don't have much room to spare. But even in a downdraft I get all the power I need with Chevron Aviation Gasoline 80/87 in our Stinson's Lycoming. Chevron 80/87 gives me performance to spare when I'm climbing, yet I can lean down for real economy in level flight. Burns clean, too; never fouls plugs.

"Flying over this kind of rugged wilderness calls for a really dependable engine. Ours has 500 hours on it now, and RPM Aviation Oils have kept it good as new. Compression is still up to factory standards. It's never missed a beat, always runs smooth as a watch. All the years I've flown, I've never had engine trouble using 'RPM'."

### TIP OF THE MONTH

Downdrafts are often violent near the top of a mountain range. Mr. Jones advises flying on the windward side of any ridge or pinnacle; then you can turn upwind if you hit a pocket.

CHEVRON AVIATION GASOLINE

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*We take better care of your plane*

T.M.'S "RPM," "CHEVRON," "PLANE FAX," REG. U. S. PAT. OFF.

# Briefings . . .

THE STORY of the otherside of War II in the Pacific is told in "Zero" by a top Japanese flying officer and the engineer who developed the *Zero* airplane. Masatake Okumiya, the pilot, and Jiro Horikoshi, the engineer, with the American author, Martin Caidin, tell for the first time the absorbing inside story of famed air and naval battles as seen from the eyes of the former enemy.

SOUTHWEST AIRMOTIVE, Dallas, marks a milestone in aviation history. It is the first company to advertise that it is fully staffed, trained, equipped and presently ready to overhaul civil as well as military turbo-jet and turbo-prop engines.

FLYING CLUBS DO PAY OFF, according to Jim Ottney of Mid-City Airport, Hudson, Ohio, who has a highly successful commercial operation based on the flying club plan. Besieged by requests for information on his operation, Mr. Ottney and his associates, Margaret "Peg" Williams and Ernie Stadvec, have compiled a booklet on the subject and are offering it for $1.

NEW YORK AIRWAYS is pushing discussions with Bell Aircraft concerning availability of a 25-passenger helicopter powered by three turbine engines. Currently known as the Bell D-216, the new

tandem-rotor transport design is said to be a powerful, compact vehicle, expected to provide one-engine-out performance. Commercial version will provide three abreast passenger seating, a maximum payload of 6,000 to 8,000 lbs. and cruise speed of at least 120 mph.

RESULTS OF A YEAR-LONG campaign against "deadwood" in the aircraft registration file of the CAA, show that the number of registered aircraft dropped from 92,155 as of July 30, 1955, to 85,320 on Jan. 1, 1956. In the same period the number of active aircraft climbed from 59,616 to 60,432. (Active aircraft are those holding a current airworthiness certificate.) The campaign also resulted in the number of inactive registrations dropping from 32,536 to 24,888.

TOTALLY DEAF PERSONS are being subjected to noise tests at Pensacola to determine what effects noise may have on those who can't actually hear it. If the tests prove that high noise levels on the subjects do not cause injury, the Navy may employ totally deaf persons to work around jets.

BOASTING MORE STRIPES than any other sergeant in the armed forces, M/Sgt. "Satan" serves his country loyally as mascot of the 437th Fighter Interceptor Squadron, 414th Fighter Group, at Oxnard, Calif. The only genuine "flying

tiger" in the Air Force, "Satan" fools no one with his sleepy countenance as he sits in the shade of the wing tip pod of a USAF Northrop *Scorpion* F-89D long range interceptor, which is his regal duty to guard.

AERONAUTICAL SERVICES, INC., Annapolis, Md., offers a new computer designed to solve all navigation problems, including the wind triangle, on one side of a circular slide rule. A four and one-quarter inch circular device, priced at $5, the computor is for use by pilots and navigators. Need for pencil or straightedge is eliminated and all data and answers are read directly on the scales of the instrument.

GRANT COUNTY, NEBRASKA, holds the distinction of having more airplanes in relation to population than any other county in the Nation—one airplane to every 36 persons, according to the CAA. In comparison with 29 planes for a population of 1,057, the county has 173 automobiles.

SPURRED BY THE INITIAL SUCCESS of their aircraft leasing operations, the American Leasing Corporation, Hartford, Conn., and officials of Beech Aircraft have agreed to step up operations. In the first six months of its existence, ALC accounted for two and one quarter millions worth of Beechcraft sales. Basic plan involves purchase of aircraft from Beech by ALC who, in turn, lease the planes to their customers.

CLIPPER SKIPPERS, Basil L. Rowe (right) dean of Pan American's pilots, posing in uniform of the modern airline pilot, and John Rogerson, bundled up in helmet and pilot garb of an earlier era, upon retirement from active service at the age

of 60 years. Both were born on Feb. 10, 1896, learned to fly as teen-agers, were pilots in World War I, barnstormed the USA and Latin America in the 1920's. Upon retirement, Captain Rowe had logged 34,800 flying hours and Rogerson a total of 28,500.

TO ACCURATELY determine the magnitude of altimeter system errors existing in various models of military and civil aircraft, the ARDC is participating in a joint test program with the Air Transport Association. Altimeter system errors are believed to be the primary reason for the increasing number of near misses reported by pilots flying assigned altitudes with 1,000 foot separation.

CONTRACTS FOR DEVELOPMENT and production of Hughes Aircraft electronic equipment, valued at $5,000,000 have been granted to Air Associates, Inc., Teterboro, N. J. These contracts are for research and development of advanced airborne communications equipment.

EX-NAVY PILOT James B. Taylor, III, flying president of the Upresit Products Corp., Danbury, Conn., keeps pace with fast moving sales of Upresit's industrial closures for metal containers, by hopping over the country in the com-

pany-owned *Navion* on visits to sales representatives. On a recent flight to Port Arthur, Tex., Jim Taylor (right) is met at the airport after a day's flight from Danbury by Clayton M. Lee, Upresit sales agent for Texas.

AFFECTIONATELY DUBBED "SHAPE," the first truly international flying club has been operating at Villacoublay, France, a suburb of Paris, since 1953. Boasting a current membership of some 50 military and civilian, fledglings representing a diverse range of SHAPE na-

*(Continued on page 82)*

# FLY WEATHER-WISE

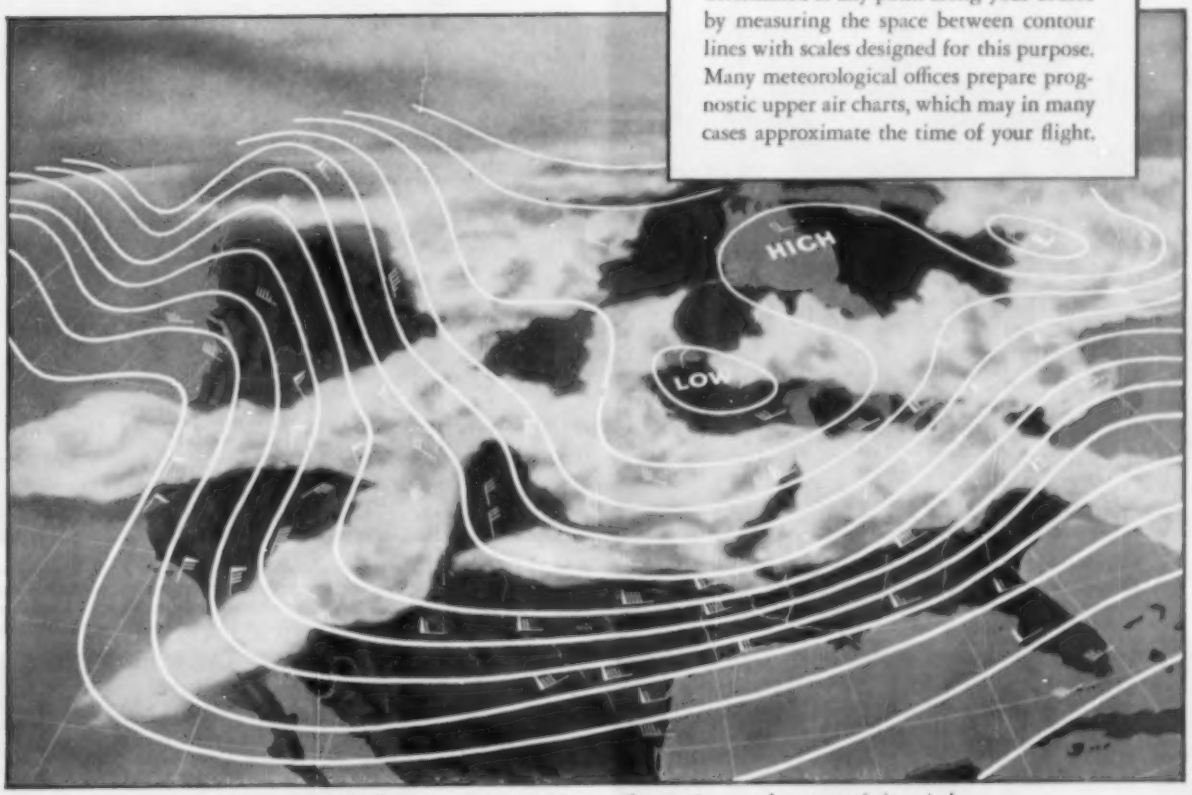
These weather items prepared in consultation with the United States Weather Bureau

# FLIGHT PLANNING

## ...the Use of Upper Air Charts

**Upper air charts** are useful in planning the least time track to your destination. These weather maps are drawn for certain standard altitudes: 5,000, 10,000 and 18,000 ft. approximately.

As on ordinary surface maps, the wind flows approximately parallel to the contour lines . . . counter-clockwise around lows and clockwise around highs in the northern hemisphere. Wind velocity can be determined at any point along your course by measuring the space between contour lines with scales designed for this purpose. Many meteorological offices prepare prognostic upper air charts, which may in many cases approximate the time of your flight.




**Use upper air charts** to plan your trip, to take maximum advantage of the wind.


*Best Pair to Get You There!*

Mobiloil AERO

Mobilgas AIRCRAFT

**As aviation** moves into the jet age the Flying Red Horse paces its progress with new fuel and lubricant advances. New manufacturing procedures developed by Socony Mobil can produce jet fuels with improved thermal stability to meet these critical requirements. At the same time piston engine planes count on Mobilgas Aircraft and Mobiloil Aero for full power and protection. Good reason it pays to fly with the Flying Red Horse!

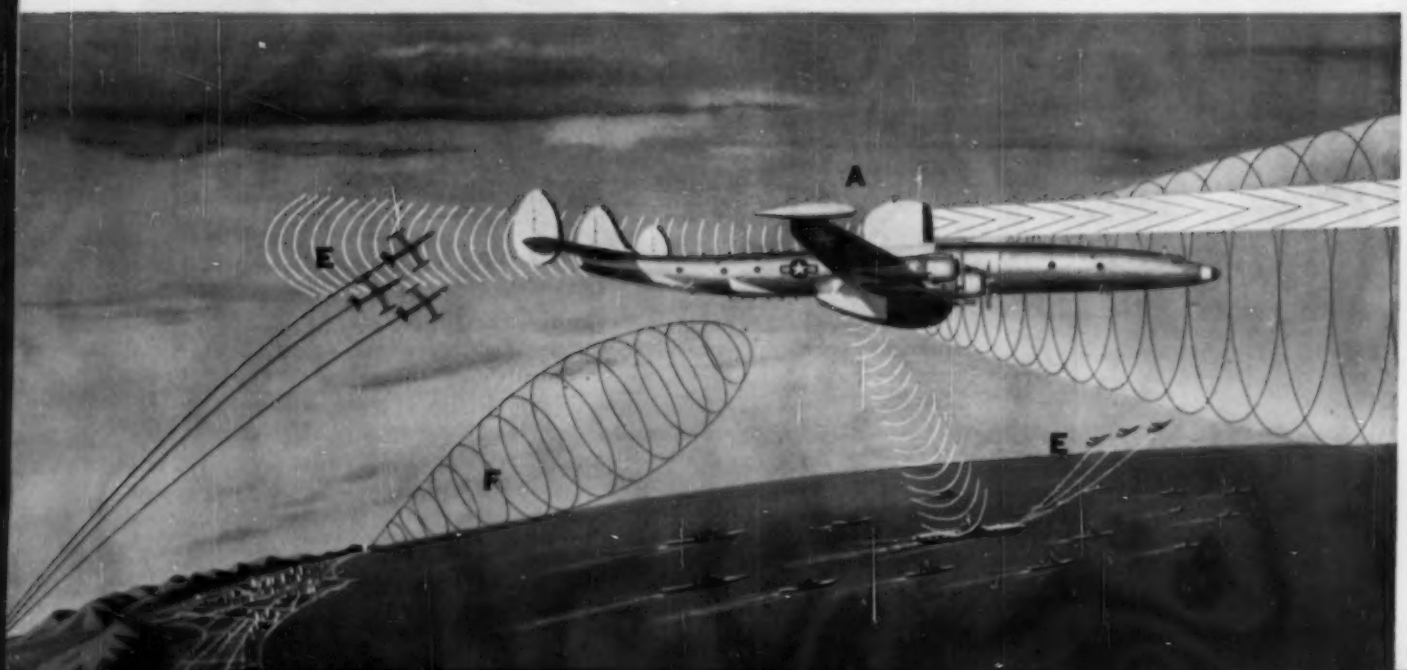
SOCONY MOBIL OIL COMPANY, INC., and Affiliates:
MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

# New U.S. Concept for

# TOTAL DEFENSE

*In this age of awesome airborne nuclear weapons, a vast umbrella of airborne electronics will safeguard our nation against sneak attack*

**BELOW—A WEAPONS SYSTEM IN ACTION.** An electronics-laden Super Constellation early-warning plane (**A**), patrolling our outermost defense perimeter hundreds of miles from our shores and borders, from its high altitude can "see" beyond the horizon and detect both high-flying and low-flying enemy aircraft (**B**). Using its powerful search radar (**C**) and height-finder radar beam (**D**) to pinpoint position of invaders, the patrol plane alerts our interceptors (**E**), which swarm aloft and are radar-guided through fog or darkness to intercept and



**LEFT—EARLY-WARNING RADAR PATROL.** Designated the WV-2 by U.S. Navy and EC-121 by USAF, these radar-domed Lockheed Super Constellations carry six tons of electronics and a 31-man crew. Super Constellations are ideal for this duty because of their famed all-weather stability and extremely long range.

**ABOVE—ROCKET-FIRING STARFIRE INTERCEPTOR.** First of the almost-automatic all-weather interceptors, the Lockheed F-94C Starfire is an example of Lockheed's leadership in the design and development of airborne electronics. This deadly defender and other interceptors will soon be supplemented by—

Farsighted Pentagon planning and recent amazing technological developments by U.S. science and industry are rapidly making our nation's TOTAL DEFENSE system the most formidable in all history.

Lockheed's role in implementing our new Weapons System concept and in Systems management, is an important one. Thousands of Lockheed military aircraft, of *nine* widely different types, are already in service. Other advanced planes, missiles and electronic guidance devices are in production, undergoing tests or on the drawing boards at Lockheed. And Lockheed's pioneering leadership in design and development of airborne electronics will continue to contribute heavily to TOTAL DEFENSE.

**STILL-SECRET F-104 SUPERSONIC JET FIGHTER.** (Photo not yet released.) A high-ranking USAF officer said of the F-104: "This is a fighter pilot's dream. We feel confident that it is the fastest, highest-flying fighter in the air, anywhere."

**THREE PHOTOS AT LEFT** show crew members of Super Constellation early-warning plane at work. (Top) Navigator plotting a fix; (center) observers at radar consoles plotting altitude, speed and course of unidentified aircraft; (bottom) fighter-director charting position and path of approaching aircraft.

# Lockheed

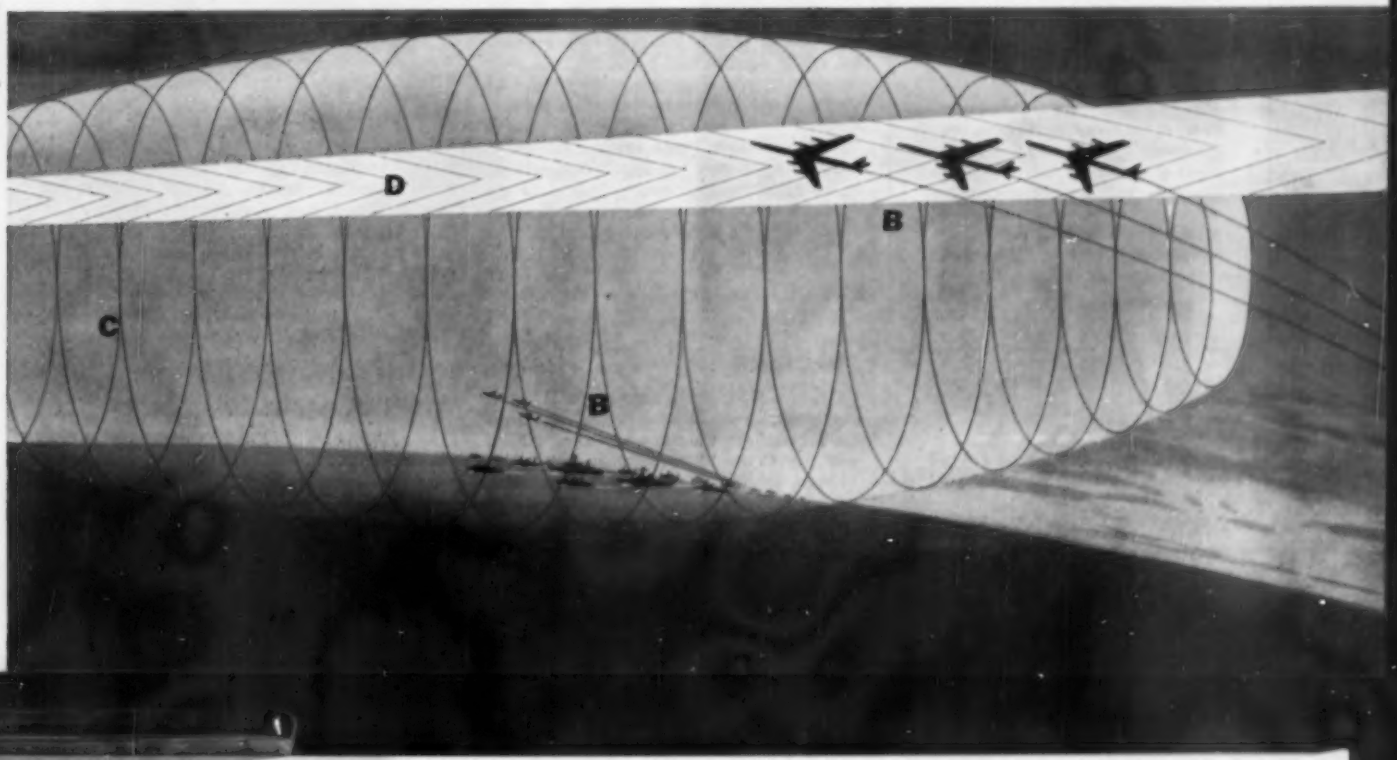
*AIRCRAFT CORPORATION*

*California Division, Burbank, Calif.*
*Georgia Division, Marietta, Ga.*
*Missile Systems Division, Van Nuys, Calif.*
*Lockheed Air Terminal, Burbank, Calif.*
*Lockheed Aircraft Service, Burbank, Calif.*

*LOOK TO LOCKHEED FOR LEADERSHIP*

**A CAREER IN MILITARY AVIATION ASSURES A FINE FUTURE FOR YOUNG MEN OVER 17. SEE YOUR NAVY OR AIR FORCE RECRUITING OFFICER.**

destroy the attackers with high-speed rockets or missiles. Any enemy aircraft penetrating our barrier patrol areas would be detected by shore-based radar stations (F) and Ground Observer Corps outposts continuously manned by patriotic civilians helping to keep our nation free.



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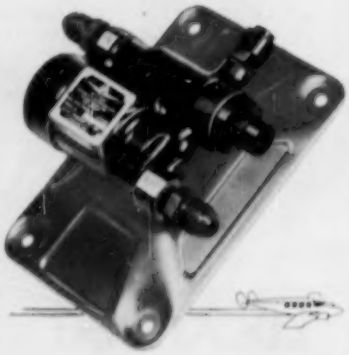
ALAR
Airline • Military
OXYGEN REGULATORS
available for
CORPORATE AIRCRAFT



. . . and here are the reasons why more and more executive planes are being equipped with ALAR . . . the fully AUTOMATIC oxygen regulator that—

- Eliminates manual adjustment.
- Conserves oxygen supply.
- Handles crew and passengers.
- Requires no flow indicators.
- Weighs only 9 ounces.
- Makes cabin interior positioning unnecessary.
- Designed for easy installation.

Alar regulators are used exclusively in the fixed installation kits produced by Zep Aero, for all types of corporate aircraft. These kits give you a complete, fully automatic oxygen control system ready for immediate use. Write for details, giving make and model of plane, to . . .

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El Segundo, California.

"Authorized distributor for Alar Equipment"

# HANGAR FLYING

## PICK UP THAT MIKE

REMEMBER THE LAST TIME you were flying in foul weather and how handy your radio worked, and especially how reassuring the voice on the other end sounded?

As a business pilot, I bump into a lot of fair weather flyers all over the United States who don't seem to see the need for,

nor use, the CAA facilities until they really get into trouble, and then they have trouble getting in on the "party line."

I wonder how many pilots know that each transmission counts as a point for the CAA facility to whom they talk. The more points, the less chance of having that CAA facility decommissioned. Even in fair weather, I suggest the use of flight plans; call the nearest station as you pass by, asking for an altimeter setting, check for traffic, or to report any unusual weather seen en route.

I don't say one should overuse the facilities, but I do say that we should use them in fair weather so that the CAA has some idea of the volume of "normal traffic" they have. The private pilot does fly more than the commercial as the statistics have proven, but we're liable to take a back seat in the near future when air traffic control will come into its own because of added speeds and volume of traffic, if we don't make our needs known now.

This is simple, there are no letters to write; simply pick up that mike and use it intelligently the next time you go across country. Your friends in the out of the way CAA stations will be glad to hear your voice and co-operate with you.

HARVEY O. DOW
St. Paul, Minn.

## POACHING

NOW I CONSIDER myself as being a pretty good pilot, having racked up about 1,400 hours in different types of planes with never so much as a nicked prop. That is, until just recently when I had a very unusual accident.

A buddy and myself both own *Swift* 125's and have a real fine time formation flying. A couple of months ago we decided to fly to nearby Valley Forge Airport for lunch. Keeping contact via unicom, we made a real nice formation landing, parked the planes and headed for the chow hall. After consuming a few hamburgers, we headed for the ships to continue our Saturday flight.

We taxied out and, after the usual engine checks, lined up with my airplane on the right hand side and prepared to take off together in formation as usual. With a go ahead motion, we applied power and started down the runway. with the tail up and the *Swift* getting light on the wheels, I was about to pull her off when something brown flashed past my left eye. In an instant the plane lurched, the prop was shattered and a red substance was splattered over the windshield.

Instinctively I pulled back on the wheel, cut the switches, and brought the vibrating *Swift* to a halt. "That can't be blood on the windshield," I was telling myself, but it sure did look like it. With my heart in my mouth, I leaped out to learn the worst.

About 300 feet behind us was a dark form lying on the runway. Amid the shouting and confusion, I found out I had just bagged a six point, 150-pound buck . . . out of season.

The pilot of the other plane had seen the deer bounding toward him but slightly to the left rear of his ship. Cutting

power and standing on the brakes, he just missed hitting the animal himself. The confused deer then darted directly in front of my whirling prop and was caught dead center. Luckily enough my only damage was a shattered prop and a dented cowling.

ROBERT H. CASSEDAY
Wilmington, Del.

## WHEN IS A PILOT?

IT SEEMED A LITTLE ridiculous of CAA to require *me* to take five hours of dual cross-country.

After all; didn't I have over 4,000 hours as navigator and radio operator in DC-4's,

*(Continued on page 18)*

1956 Piper Apache—Model PA-23

# New Gulf Aircraft Engine Oil proved 5 ways better!

1. **Improves internal engine cleanliness**
2. **Minimizes sludge and oil inlet screen deposits**
3. **Lowers rate of parts replacement due to wear**
4. **Has low pour-point for ease of starting, even in coldest weather**
5. **Increases periods between engine overhauls**

Gulf's great, new Aircraft Engine Oil has been *extensively flight service tested* in all conventional types of aircraft engines—not only by Gulf, but by private operators, executive fleets and airlines.

They keep confirming these facts: Cleaner oil inlet screens; remarkable freedom from piston ring and valve sticking; reduced rockerbox coking.

It simply means this—new Gulf Aircraft Engine Oil gives you *maximum operating efficiency and increased economy through cleaner engines and less frequent overhauls.* Try it and *see.*

Gulf Oil Corporation • Gulf Refining Company

GULF
AVIATION PRODUCTS

NOW...
27
CHANNELS
narco
simplexer
VHF RECEIVER
and TRANSMITTER

All the frequencies you want for any tower or center communications can be accommodated in the new 27 channel Narco Simplexer. This top-quality communications unit embodies a wide-band transmitter—actually six separate transmitting circuits—for uniformly strong transmission plus the famed Narco "whistle-stop" tuning feature which lets you tune the VHF receiver precisely to the frequency desired.

The Simplexer accommodates all 24 frequencies used between 118.1 mc and 122.8 *plus* 126.7 mc, *plus* two additional crystals for special purposes.

No other communications unit available has the quality, the proven stamina and reliability plus compactness for anywhere near the price. Your communications problems will be solved with the new VC-27 Simplexer. See it at your Narco dealer's or write for new brochure.

**Omniplexer Adds OMNI for only $195**

Here's the answer for a low-cost, accurate Omni—the Narco Omniplexer which can be plugged into any Narco Simplexer. Only 3" high and 6¼" wide, it has vernier tuning for precise course setting. Ideal as a basic navigation system or the low-cost answer for dual omni.

narco
NATIONAL AERONAUTICAL CORP.
Ambler, Pennsylvania.

## HANGAR FLYING

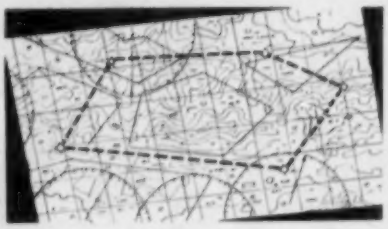
*(Continued from page 16)*

DC-3's, Boeing 314's and De Havilland *Doves*?

You'd think CAA could accept, as proof of competence for instance, that flight from Hong Kong to Los Angeles in a C-47, or from London via Iceland and Greenland to Toronto in the *Dove*.

Well, yes, I *was* flying as a student pilot in the Aeronca. I bowed to the regulations and engaged an old pro to give me the required cross-country check.

It was a hot day as we took off for a round robin—Quartz Hill, El Mirage, Victorville 66 and back to Van Nuys. In my



blissful innocence, the heat meant only that it would be uncomfortable at the desert fields, and require a little more take-off run.

I decided to give my instructor the thrill of seeing a real Magellan-type operation, so loaded the Aeronca down with E6B, American Airlines computer, forms, plotters, and charts all neatly marked and blocked for "ETA," "ATA," and "Score."

The check points came by and were duly noted; to "Happy's" frequent queries as to, "how many minutes to X?" "Where is the nearest landing area?" "What is that lake over there?" I could snap off the answer with ease. We made our last stop on dusty Victorville 66 and had lunch. Temperature was about 105°, elevation 3,225.

"Should we gas up?" I asked Happy.

"This is your flight, Doc," my mentor replied, "I'm just along for the ride, and don't expect any advice from me until you're about to clobber yourself."

At the 3.9 gph fuel rate I had figured we now had 25 minutes reserve to return to Van Nuys via the San Gabriel Mountains and Ontario. I decided not to fill the tanks. The take-off run at Victorville 66 was more than twice as long as I was used to, with the heat, altitude, and extra weight, but once off the ground, these factors slid out of my mind.

The *Airknocker* labored and the oil temperature approached the red line as we crossed the eroded San Gabriels with a scant 100 fpm rate of climb. But we had it made now; all down hill the rest of the way.

The true air speed was lower than flight plan, as I hadn't taken the long climb into consideration. Thus at Pasadena, 20 miles from Van Nuys, my fuel score showed only 15 minutes reserve. I turned around and asked Happy if he thought we should refuel. "It's your flight," he replied.

"What the heck," I thought, "if he's not worried why should I be; he goes where I go. Also, 15 minutes of gas is 15 miles." We continued.

The engine sputtered and stopped 1,500 feet over Burbank, with the runway of our home field in sight, seven miles to the west.

"Do you want to take it?" I asked Happy.

"It's all yours," came the reply which by that time had a vaguely familiar ring.

I turned toward Burbank's airport and began establishing a glide. No good. Off to the left I caught a sight of a dry wash which hadn't been apparent before. I immediately made a 90° turn in that direction, hoping we would be higher than the power lines which ran across the wash. We cleared them okay. Happy took over for a moment at this point to slip off about 50 feet, then released the controls again, with the advice to "Mush it on."

And mushed on it was. A short roll in the rough sand and gravel and that was it.

This was a day of many morals.

Item. An Aeronca is not a DC-4 and is not amenable to navigation by the same methods.

Item. It is ridiculous to equate gas consumption rates during climb, in heat, at maximum gross, with figures determined in level flight, near sea level, in cool air, with minimum load.

Item. Any pilot is something less than wise who relies upon the self-preservation instincts of a check pilot.

W. KEITH WOODMANSEE
Walnut Creek, Calif.

---

## QUICK TRIP

THE *CUB* WAS JUST OUT of the overhaul shop, with new fabric and a newly overhauled engine. The run-in had been completed and the airplane was ready for a test hop.

It was a fine warm Spring afternoon and there was a fair crowd at the little Texas airport. Sundown wasn't far away and the air was still and smooth. I climbed into my "new" *Cub* proudly and hurriedly, wanting to make a test flight in the smooth air.

The engine was already warm and, as I taxied to the end of the 1,200-foot runway, I noted that the old reliable cork float gas gauge showed the fuel to be

low. No time to bother with refueling. Those gauges always leave a nice margin for safety, even after they register empty. Yessir, those are the best kind, the most accurate and reliable.

At the south end of the runway were

*(Continued on page 74)*

Don Vest, Vest Aircraft & Finance Co., P. O. Box 5306, Sky Ranch Airport, Denver, Colorado.

Gene Hudman, Stonnell and Holladay Aircraft Sales, Carolina Division, Municipal Airport, Charlotte, North Carolina.

Peter Graves, Southern Ohio Aviation Sales Co., Dayton Municipal Airport, Vandalia, Ohio.

John Wilsdon, Executive Flying Corporation, P.O. Box 122, Lambert Field, St. Louis, Missouri.

Charles H. E. Westerman, British Colonial Airlines, Calle Lopez No. 1 — Despacho 502 Mexico, (1) D.F., Mexico

H. Warren Holladay, Stonnell and Holladay, 843 Washington Building, Arlington Towers, Arlington, Virginia.

H. Leibee Wheeler, Buffalo Aeronautical Corporation, Buffalo Municipal Airport, Buffalo, New York.

Norman Hoffman, West Texas Flying Service, Midland Airport, Box 82, Midland, Texas.

Art Maurer, Arthur Maurer Co., Inc., LaGuardia Field, New York, N. Y.

B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota.

Robert F. Wood, Newport Air Park, Newport, Rhode Island.

A. M. "Sima" Bertolet, Reading Aviation Service, Inc., Municipal Airport, Reading, Pennsylvania.

Ira Hartzog, Aero-Tex Corporation, 3300 Love Field Drive, Dallas, Texas.

J. B. Redwine, Fairfax Aviation, Inc., 3301 Fairfax Trafficway, Fairfax Airport, Kansas City, Kansas.

Max R. Brand, Aero Commander Dist. (Downtown Airpark), Hangar 3, Municipal Airport, Tulsa, Oklahoma.

E. H. "Ted" Talon, National Aero Sales Corp., Midway Airport, Chicago, Illinois.

Dale Repp, Jr., Aero Southern Corp., 601 Broadway, Nashville, Tennessee.

W. H. "Bill" Buchanan, Sales Manager, Johnsons Air Interests, Inc., Horlick-Racine Airport, Racine, Wisconsin.

Louis Humphreville, Executive Aircraft Corporation, Municipal Airport, Pontiac, Michigan.

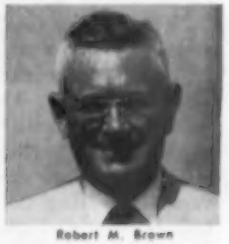
L. S. McIntire, Vest-Livingston Aircraft, Inc., International Terminal Building, International Airport, Oakland, California.

John A. "Jack" Baumann, Santa Monica Aviation, Santa Monica Airport, Santa Monica, California.

Herrol Bellamy, L. B. Smith Aircraft Corp., Miami International Airport, Miami, Florida.

Lucien M. Taittac, Trans-Aire Corporation, Pan-Air Building, New Orleans Airport, New Orleans, Louisiana.

Joseph H. Frost, Jr.



Robert M. Brown

Commander Sales Company, Terminal Building, International Airport, San Antonio, Texas.


NATION-WIDE SALES and SERVICE

AERO DESIGN Commander

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TULAKES AIRPORT • OKLAHOMA CITY, OKLAHOMA

FLYING
VOLUME 58, NO. 6
JUNE, 1956

AN EDITORIAL

# The Cost of Defense

I WOULDN'T know a budget if it walked up and bit me but I can do simple figures without chewing the end off the pencil. Things like this intrigue me . . .

The B-52 global bomber is coming off the production line and will be the backbone of American strategic power for several years at least. As such, it is the world's best current hope to prevent all-out war.

Now say we require 1,000 of these planes—a reasonable number—and distribute them with their complements of tankers and atomic weapons at domestic and overseas bases. The annual bill for this one phase of defense will be somewhere between seven and eight billion dollars throughout the effective era of the B-52.

Or take the item of continental defense with its radar screen across our northern perimeters; its interceptor network of electronic computers directing planes, missiles, anti-aircraft guns and civil defense warnings—another five or six billions annually.

Then there is the urgent guided missile program. Development of 20-megaton warheads—and heaven alone knows how much bigger they may get—has resolved the need for great accuracy in intercontinental missiles. With one of these clunkers you shoot at a nation rather than a target. Russia claims heady progress in such long range projects and if she beats us to their effective development—well, that would cook our goose. The United States will probably lay down 50 billion dollars for the ultimate intercontinental missile and be lucky if it gets the real McCoy.

Not to itemize the details, I estimate that the bill for airpower over the next decade could run to better than 30 billion dollars annually, regardless of the elimination of waste of any sort. Then, if one adds the Army and Navy annual bills, we sure get into the stratosphere economically as well as meteorologically.

I think of these things when I hear serious talk about a vast fleet of logistic air transports, or super carriers or atomic cannon. I think of them when I meditate on our need for a modern system of air traffic control, and an air age education program, and kindred basic facets of national scope.

And I think of them when I study the duplication of overhead in our multiple service defense department. A United States Senator recently remarked to me that he liked the idea of multiple services because it promoted keen competition in weapons development. Well, I too like competition, but I'm wondering if the Russians don't furnish us enough without having to drum it up by a multiple service organization.

It seems to me that, unless future government is going to spend its annual gross budget wholly on military affairs, we had better be about getting a more streamlined package of defense. It's a cinch we can't have everything. We had best find out what we must have and bid the rest a sad adieu.

Alas, this is easy to say, but the accomplishment is a heart-rending process. Military reformation is only one degree removed from religious reformation—both being grounded in the soil of personal devotion—and the transplanting of personal devotion is a job for the very angels themselves. Both the timing and the urgency of such a process must be just right. I don't say the point has been reached but only that serious consideration is already imperative.

We cannot afford to sacrifice lead time in concept any more than we can afford to sacrifice lead time in defense production. And it is in the matter of concept that the free world should be able to outstrip the slave.

Benjamin Franklin once remarked to the effect that the Colonies could afford defense but that they could not afford the cost of pride, intellectual laziness, and devotion to obsolescent organization.

Could we too afford defense if we had the capacity to write off the costliness of our human frailties? This is where the Soviet really challenges us. What a turn of fortune it would be if the pressure of Communism forced us to cultivate our singleness of devotion to the point that our security was no longer an economic problem.

Gill Robb Wilson

*Gill Robb Wilson*
*Editor and Publisher*

# THE FIRST NONSTOP DC-7 AIRCOACH SERVICE COAST TO COAST ONLY $99!

*Plus tax*

*The comfortable lounge, available to all passengers*

## American presents "The Royal Coachman"—new luxury aircoach

## New York-Los Angeles $99 *plus tax*— *Washington-Los Angeles $98 *plus tax*

On May 20th, American introduced the *first nonstop aircoach* service coast-to-coast on the DC-7, world's fastest airliner. This is the *fastest* transcontinental aircoach service.

"The Royal Coachman" is also the most *luxurious* aircoach service in history. You can *reserve* your seat when you buy your ticket. There is a spacious lounge and fine meals are served, available at economical prices.

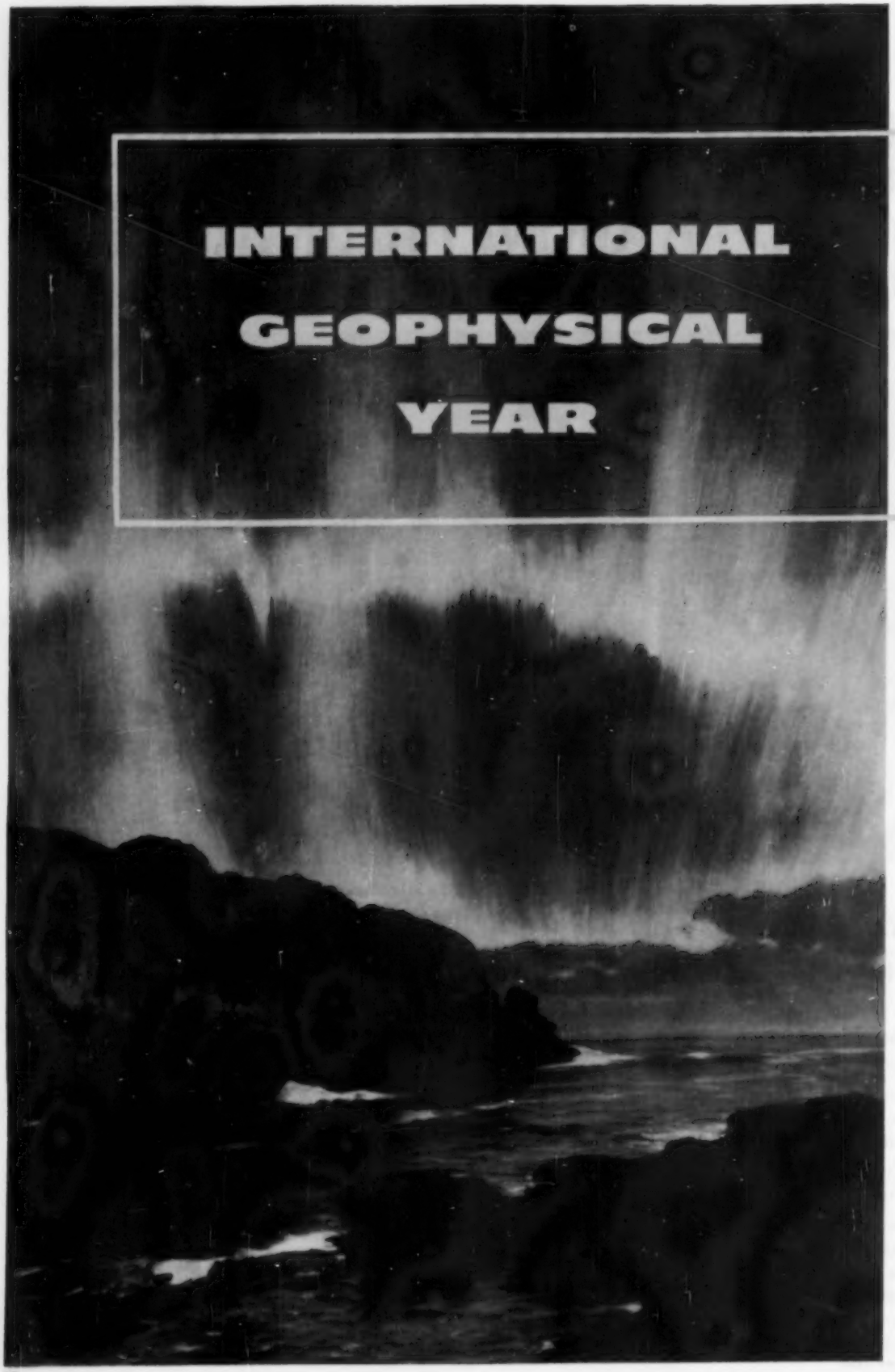
"The Royal Coachman" is an *all-coach* service, operating every day in the week. For reservations and flight information on this new service, see your travel agent or call your nearest American Airlines ticket office.

*service starts *June 17th*

**AMERICAN AIRLINES**

*America's Leading Airline*

*Subject to Civil Aeronautics Board approval*


INTERNATIONAL
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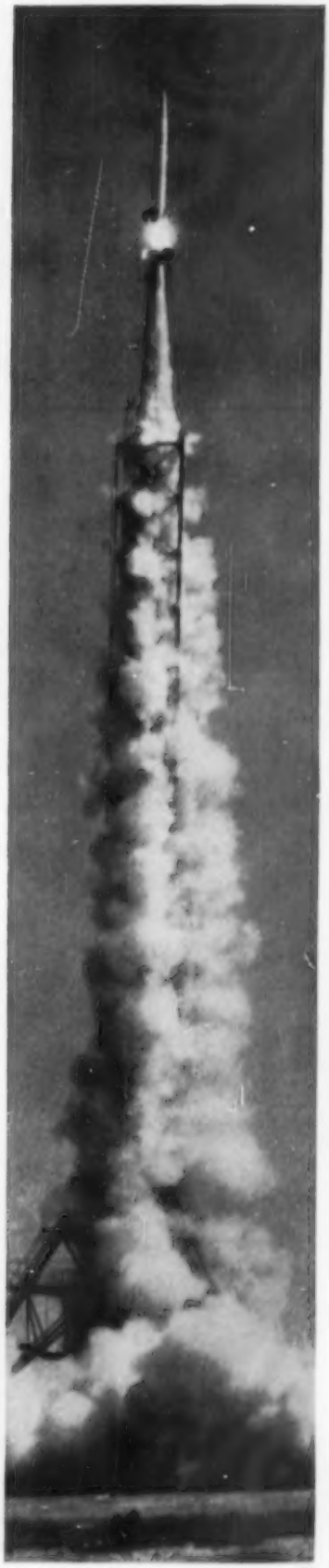
YEAR



*Forty-four nations plan to participate in a scientific program to study the earth and its response to physical forces acting upon it.*

**By MARTIN CAIDIN**

SEVERAL YEARS AGO a group of geophysicists, representing numerous different nations, discused the possibility of organizing an International Geophysical Year, during which civilization would conduct the most comprehensive joint study of the earth ever undertaken.

Gradually the plans of the scientists neared reality. Each nation represented in the plan appointed its own national committee to form an international panel. The 18 months from July 1957 to December 1958 were selected to be designated as The International Geophysical Year (IGY)—a period of unprecedented assault by science on the secrets of our planet.

Forty nations originally agreed to participate and the number has since increased to forty-four. The national committee of each country was charged with responsibility for planning, directing, and executing research projects. Research findings, when assembled and collated, would be submitted to the international committee and subsequently distributed to each of the forty-four nations.

For example, one subject under investigation is the "Circulation of the Atmosphere." Each of the 44 nations will conduct research into the characteristics of the atmosphere, of which circulation is one phase.

Each nation appoints a committee which executes research to gain exhaustive data on the movement of the air ocean. Such research will be carried out from sea

*GEOPHYSICS is a science dealing with the earth's response to the physical forces acting upon it and within it, such as the force of gravity or the force of its own magnetic field.*

*The geophysicist is concerned with interplanetary and interstellar forces acting upon the earth from without and likewise upon gravitational and magnetic forces acting upon the earth from within.*

*The breadth of this science forms a background for numerous specialized studies—geology, metallurgy, meteorology, navigation, electronics, oceanography, seismology and many more.*

*The end result of all this science reaches our standard of living in adequate supply of gas and oil for our cars, minerals from which to fabricate our industrial machines, knowledge upon which to forecast our weather, data from which to make our maps and in hundreds of other practical ways. There is no individual of us all who will not benefit from the world-wide efforts to be put forth in the coming International Geophysical Year.*

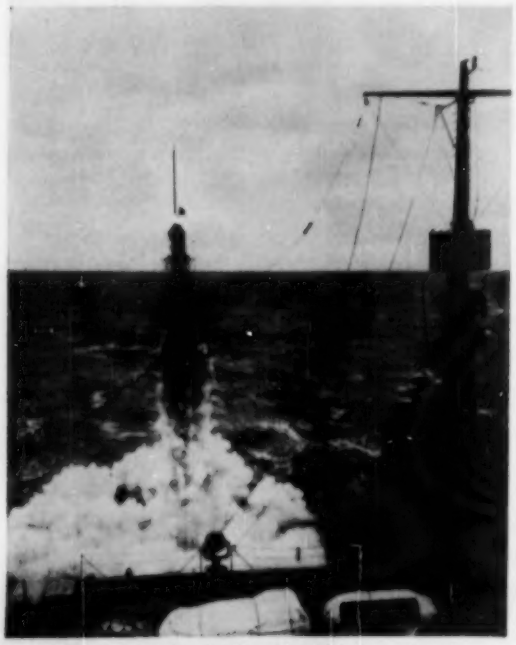
*Undoubtedly a vast accumulation of new knowledge will result because, for the first time in history, the scientists have radical new tools with which to work. With airplanes they can get all over the surface of the globe and, by rockets and satellites, far out into space. With magnetic, electronic and radiation techniques they can plumb and probe and trace from the core of the globe to the limits of outer space. In fact, we can anticipate that the International Geophysical Year will mark radical progress in man's knowledge of what makes his world tick. It seems worthwhile then that we should all know something about the coming effort, and FLYING intends to follow the progress of the Geophysical Year, interpreting in layman language what takes place as best we can. This introductory article, it is hoped, will be a kickoff for subsequent reader interest in the subject.*

THE EDITOR

level to the ionosphere. Every type of scientific instrument from thermometers to giant rockets will be employed. Certain nations will conduct their research far beyond their own borders, over ocean areas, in the vicinity of remote islands, in the Arctic and Antarctic regions.

When a participating nation completes that phase of research concerned with circulation of the atmosphere, all the data collected will be collated into a single volume. This printed data, with accompanying charts, graphs, computations, photographs and other supporting evidence, will then be forwarded to the The IGY Executive Committee. The Committee having received reports on the same topic from all 44 nations, then distributes the sum total report to each participating nation. Each recipient nation then further prepares copies for distribution among its own scientific groups.

The net result is that the scientists of each nation have available a detailed report on the circulation of the atmosphere in every area of the world. The benefits of even this one small segment of scientific effort are enormous. We are indebted to the atmosphere for, among other things, oxygen, moisture, power, and insulation against deadly solar radiations. All our research to date, however, has tended to neglect this one important life-giving property of the atmosphere—its motion. We have only to imagine a world-wide calm to envisage disaster. Winds distribute tropical heat to other areas, transport moisture globally, drop rain on land masses, and sweep polluted air from built-up areas. The manner in which the vast air ocean circulates still lacks full understanding. When we better understand this action, we will be on our way to escaping the damage wreaked by sudden storms, and may even find that local weather can be somewhat controlled.



Launching an *Aerobee* from the *USS Norton Sound*.

The circulation of the surface oceans, their wave patterns, currents, and other characteristics also will come under sweeping surveillance. Terrestrial crust formation, ocean depths and life, volcanic activity, subterranean faults and tremors—literally every aspect of the planet will be subjected to the scrutiny of tens of thousands of engineers and scientists, and to the probing abilities of modern scientific instruments.

For the first time in history the Antarctic will be invaded in force. The attack has already been under way for many months. Nowhere is there more wonder and mystery for the scientist than in this frigid land at the bottom of the world. It holds the planet's greatest ice sheet and is a major crux of magnetic and meteorological activity. We know distressingly little of its climate, atmosphere, land, and physical traits. Previous expeditions have scratched the surface and no more. The Antarctic, therefore, will receive the special attention during the IGY of at least ten countries which are dispatching formidable scientific expeditions to the area. Two international conferences already have been held in Rome and Paris to allocate sites for 32 research stations, of which the United States will have six.

During the IGY the United States will launch hundreds of instrument-carrying vehicles, ranging from small balloons to multiple-stage rockets, using both solid and liquid propellants. Rockets will be fired to altitudes from 20 to over 200 miles, and firing locations will extend from pole to pole, from deserts to ocean vessels. In addition to the American launchings, other countries will fire hundreds of sounding rockets to increase the geographical coverage.

The scientific purpose of the (*Continued on page* 54)

Wealthy Baghdad land-owner, Sheihk al-Noori (top) who recently soloed this Auster *Autocar*. Iraqi Aeroplane Society's clubhouse provides background. Inset: Down-town Baghdad.

# Magic Carpets over Baghdad

*appear in the form of trainer planes with modern Ali Babas at the controls.*

By JOHN O. NIGRA

WHETHER ONE CHANCES to recall the Assyrian winged bull of Nineveh or the paraffin wings of Icarus, flying over the ancient cities of Iraq gives one an awareness of past civilizations unequalled in any other part of the globe. Rich contrasts between new and old, such as represented by an oil derrick and a ruined temple, stand out sharply from the air.

Having helped modern Ali Babas solo in modern flying carpets has been a chore of the writer in Baghdad while there on a Fulbright geological fellowship. The carpets were Auster *Aiglets* and *Autocars*, British high-wing monoplane, single-engine trainers; and the Ali Babas were eager, intelligent flight students, most of whom were training seriously for careers in commercial aviation in the Middle East.

The flight operation is based at the Baghdad International Airport and is known as the Iraqi Aeroplane Society. It is heavily subsidized by the government, mainly to provide training for non-military Iraq pilots who are absorbed by governmental agencies such as the Minister of Agriculture for crop dusting, the Directorate of Customs for smuggler aerial-patrols, and by Iraq Airways, the government-owned airline. There is a flight school for the Air Force at the military field on the east bank of the Tigris, just south of Baghdad. However, the Iraqi Aeroplane Society is the only fixed-base civilian operation in the country. High maintenance costs and overhead, irregular school scheduling, and low instruction fees make it impossible for the operation to become self-sufficient. A limited amount of charter work for oil companies and construction firms helps out the financial picture.

All permanent flying personnel in the Society is Iraqi, many of the instructors having trained in the United States or England. Chief flight instructor, Nuri Ghanabi, is one. He trained in England and holds British commercial ratings for helicopter and fixed-wing aircraft. Administrative personnel also are all Iraqi. In maintenance this is not the case, although British mechanics on contract are being replaced by nationals as rapidly as the latter are sufficiently trained.

Stanley Baird, an Irish engineer, with elegantly uniformed Iraqi line-boys, one of whom is gassing an Auster *Autocar*.

(*Continued on page 76*)

The author, Peter M. Bowers, puts the 1912 Curtiss Pusher replica through its paces.

# An antique plane tests a

CONSTERNATION GRIPPED the occupants of the airliner as it waited for clearance—passengers had their noses pressed flat against the windows and the co-pilot was almost falling overboard as he leaned out to get a better view of the cause of the commotion. The pilot, in response to radio clearance, startled the tower with a firm, "We're not moving till I see if this birdcage out here can take off!"

Cause of this unorthodox conduct was a full-size and airworthy replica of a 1912 Curtiss pusher. Since the airliner had relinquished take-off precedence to this apparition, which had been holding position near the runway, the tower gave it a green light. Its pilot then opened throttle, and the birdcage rolled to the middle of the runway and stopped. Leaving the engine running, the man stepped from his seat, lifted the front end with one hand, turned the whole spidery assembly until it was aligned into the wind, and put the nosewheel back on the ground. Regaining his seat, he fastened his safety belt, reopened the throttle, and within seconds was airborne after a run of 200 feet.

What was this fugitive from antiquity doing on a busy metropolitan airport in the first place?

Back in 1915, Walter Bullock, now a very senior pilot for Northwest Airlines, graduated from the Curtiss Flying School—taught by Glenn Curtiss himself. This made him, at 17, the youngest licensed pilot in the country. He could not afford a new plane so obtained a damaged 1912 model similar to the one used by Lincoln Beachey in his famed exhibitions, and rebuilt it. Bullock then embarked upon a professional aviation career that has continued to the present, but flying for a living didn't detract a bit from his yen to fly for the fun of it. After World War II, the desire to fly something a bit different from contemporary lightplanes made him recall the old open-air pusher. Extensive search failed to locate one that could be rebuilt, so he chose to build a replica from scratch.

The decision to do this was one thing, but to engineer the design and build the ship was another. In the interests of reliability and safety, he decided on steel tubing instead of wood and bamboo for the basic fuselage structure; and a modern air-cooled lightplane engine instead of the heavy water-cooled original. Old aviation magazines yielded accurate three-view drawings. Most structural details were easy to obtain, with one exception—the airfoil section. So Bullock resorted to direct action. Taking the best sideview photo in his picture album, he made a copy negative of it and enlarged the section that showed the wingtip edge-on. This gave him the exact airfoil on a reduced scale, and subsequent transfer of the ordinates to working drawings was a simple matter.

Once the drawings were completed, there really wasn't

The author (at rear) spins prop on the Curtiss Pusher for E. D. "Hud" Weeks, at the controls.

The author about to ask for "contact" on "Bullock's Birdcage" otherwise known as a Curtiss Pusher.

Some of the spirit of bygone days has been recaptured by building an authentic replica of an early pusher plane.

By PETER M. BOWERS

# modern pilot

much airplane to build. The DePonti Aircraft Mechanics School in Minneapolis began the job early in 1947, and in a few months, the brand-new old timer was ready for a tryout. It was similar in all aerodynamic respects to the original, but a number of concessions were made to modernity in other ways. Instead of hard bicycle tires and wire wheels, the replica used fat low-pressure donuts from a Piper *Cub*, which also provided the added ground safety factor of hydraulic brakes. Many old-time airplanes were damaged from being unable to stop their landing roll before going through the fence. The tricycle undercarriage was true to the original, however, in that it had no shock absorbers, nor was the nose wheel steerable. Actually, steering had not been necessary on the original because, in those days, pilots didn't taxi all over the field to get into take-off position; they took off from the spot where the engine was started. As far as the pilot of the replica was concerned, turning the ship by hand at the end of the runway, or even using the runway at all, were merely concessions to modern traffic procedure and were not normal phases of antique pusher operation.

The 600-pound structure was largely of steel tubing, although the 26-foot wings duplicated the originals faithfully in that the ribs were laminated to form from wood strips and the spars were wood of the original size and section. The engine chosen was a 75 hp Continental. A further concession — an instrument panel containing basic engine and flight instruments was provided. Since there was no place ahead of the pilot where this panel could be mounted, it was installed flat on the main longeron, to the right of the pilot and slightly behind him at seat level.

Single surface airfoils and mid-wing ailerons distinguish the Pusher.

At first glance, the control column appears to duplicate that of the original, which featured a wheel atop a movable column. Fore-and-aft (*Continued on page 58*)

Original, creative thinking is encouraged. Here instructor presents for solution the problem of making necessary changes in assembly drawings for an aircraft rudder.

# CRADLE OF DESIGN

**Competition for trained men in the aviation industry is crucial. Northrop's speeded up, specialized training answers the challenge.**

By C. T. "TOM" REID
*Director of Engineering, Northrop Aeronautical Institute*

IT WAS ONLY THREE MONTHS after Pearl Harbor. The nation was desperately seeking to marshal its skills. Then, as now, the aircraft industry was critically short of technological people.

John Northrop, the pioneer aircraft designer, sat in his blacked-out office and "thought out loud" for the benefit of Jim McKinley, his education consultant.

"We'll do it, Jim," he decided. "We'll set up a school to serve not only ourselves but the entire aircraft industry. We'll compact a practical engineering education into two intensive years and teach young men what it took me ten years to learn."

From that decision was born the Northrop Aeronautical Institute which, located in Inglewood, Calif., now has an enrollment of more than 1,000 students hailing from the 48 states and 18 foreign countries. And probably more significant still—from a quality standpoint, the curricula of the Institute are accredited by the Engineer's Council

Left: Outstanding pioneer in aviation, John K. Northrop, Technical Adviser and James L. McKinley, Managing Director at Northrop Aeronautical Institute.

for Professional Development. Since that March day of 1942 the aircraft industry has become the largest single field of industrial enterprise in the United States, numbering some 850,000 employed personnel. Yet such have been the scientific and engineering demands that the supply of skilled help available lags far behind requirement and the need for specialized aviation education grows daily more acute. Aviation itself has grown to the point where it is a yardstick of national prowess, a denominator of peace and war, a telescope of history. And certainly the planes themselves become continually more complicated. Thirty years ago, John Northrop alone designed a plane, doing all of the aerodynamic calculation and stress analysis single-handed. And when this was finished he went out into the factory and made parts for the plane. What a contrast this is with today's practice where hundreds of engineers and designers spend thousands of man hours to get a new model even as far as the wind tunnel tests. For example some 320 engineers already have been engaged in projecting the design of the DC-8, Douglas jet transport.

"Two primary factors are helping us here" says Director McKinley. "One is the type of student we attract—eager to learn and get ahead. The other is our two-year course of concentrated higher education. By eliminating liberal arts subjects and scheduling more hours of instruction—seven hours per day, five days per week—and more weeks per year (48)—we actually compact three normal school years into two. Beyond that, we concentrate on the essentials of Aeronautical Engineering, the things a new man in the engineering department at an aircraft plant should know right from the start, if he is to get ahead as fast as possible."

From the day a student enters Northrop we try to give him the feel of industry. Classes are taught in the atmosphere of an aircraft plant's engineering department, by a faculty chosen for industrial experience as well as academic attainment. Knowledge of bench as well as book is required in our faculty from the newest instructor to the Director of Engineering. As a result, Northrop graduates find their first employment after graduation virtually a continuance of their student experience. There is no period of indoctrination to a completely different atmosphere and unfamiliar problems.

Our classes are kept small, and the instruction is highly personal, with "learning by doing" emphasized. Engineering subjects are brought to life in the classroom by treating them in specific aviation terms. Principles and laws are illustrated by examples of engineering usage. The unknowns in mathematics problems are such real factors as the span and chord of an aircraft wing. In physics, the laws of fluid motion and pressure are demonstrated in the actual operation of aircraft hydraulic systems.

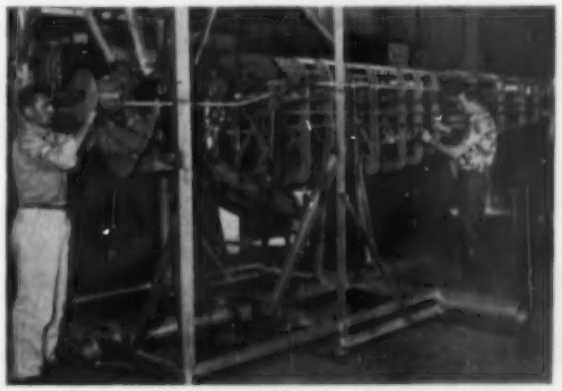
In shop and laboratory work, which is coordinated with classroom instruction, the student works with the same tools, testing devices and processing equipment as used in the aircraft industry. In design and drafting practice, the actual manuals of major aircraft manufacturers are used. Students fabricate, process and test materials; conduct engineering projects by standard methods; learn at first hand the functions, operation and installation of components, accessories and power plants.

Actual design and production projects are stressed. In carrying them out, the students work in a project group, following the practice of an aircraft company's engineering department. Starting with design sketches, the project moves through layout, detail drawings, lofting, mock-up, fabrication, testing and assembly to the completed plane.

This insistence that everything be taught in aviation terms draws cheers from an industry hard pressed for men able to step in and get (*Continued on page* 66)

Northrop students translate blueprints into plaster patterns.

An Engineering Drafting and Design room at Northrop.



Students work on design and construction of a modern lightplane.

Northrop Aeronautical Institute in Los Angeles industrial area.

# THE AIRMAN'S WORLD

*"We will give the names of our fearless race*
*To each bright river whose course we trace . . ."*

So sang Felicia Hemans in her Song of Emigration,
and although the unhappy English girl
of long ago never saw America and its rivers,
she truly sang of us—of Susquehanna and Suwannee,
of Columbia and Colorado, of Missouri and
Mississippi, of Red and Rogue and Rio Grande,
of Tombigbee and Trinity, of Platte and Powder
and Wichita and Wabash and a thousand more.
And to whom but the airman is it given to see
how the silver threads winding far beneath his wing
shaped the primeval patterns of travel,
divided the later boundaries of sovereignty, decided
the issues of war and apportioned the powers of nature.

How happy is our vista to mark their distant
courses by the canyon wall, or trace them
over the prairie by the green hemstitch
of cottonwood and willow, or follow them in lowland
by the mist of their breath at sunset or in the dawn.

And if at times the river confuses us by turning
back upon himself or hides from us beneath
convected patterns of fog, he more often orients
us on the path to destination. But regardless,
the airman must count the river among
his tutors of heart and mind
in things beyond the skill of the cockpit.

For is it not true, you airmen of this land, that
we who are privileged to watch it in continuous
panorama, bisected river by river, must
come inevitably to brood over it?
In what eternal origins rise the currents of our
destiny and to what eternal source do they return in
the fullness of time? Shall this land fade
as all before have faded in the fragmented patriotism
of their peoples? Or may we, custodians of fresh
perspective, better trace in our time those currents
of truth and freedom which are the silver
threads of enduring empire winding down the years?

For let it be known that of such matter, as well
as those of more material things, is
the airman's world composed.

GILL ROBB WILSON

A deluxe model of the L-2 Autopilot Controller mounted on the panel of a *Bonanza*.

I CLIMBED INTO THE new Cessna 170 at Cleveland-Hopkins airport and began to look over the panel and auxiliary equipment.

"It's a typical Cessna setup," Jack called over his shoulder as he unloaded his equipment from the baggage compartment, "that is, with the exception of 'Little Joe.' Give him a workout and let me know what you think of his flying."

With that, my introduction to "Little Joe" was made. Jack picked up his luggage and boarded his twin-Beech, destined for two weeks fishing in Canadian waters around North Bay. He had left the 170 in my care, to use while my ship was undergoing its annual.

As soon as the Beech took off, I sat back in the Cessna and, with the instruction book opened in front of me, read more about Little Joe, the Lear L-2 autopilot. Instructions were clear and concise. It was just a matter of making adjustments on the controller which consisted of a small box with four knobs. One knob to turn left or right, and another to climb or dive. Two smaller knobs at the bottom and left side are for roll trim and pitch trim.

Why not give it a try and see if Little Joe was as sharp as Jack claimed? I started the fan and called the tower for taxi instructions. While taxiing to runway 36 for a north take-off, I snapped on the master switch of the L-2 to allow the electronic amplifier or "brain" to warm up. By the time I ground checked the engine and was cleared for take-off, more than five minutes had passed. According to the book, this was ample time for the L-2 to get ready. As soon as the wheels of the 170 broke ground, I set up a normal climbing attitude and then flipped the engage switch to *On*.

Little Joe took over and immediately began to show me up. As it was a hot summer day, thermals slapped at the Cessna and under my hand the airspeed and heading varied a little. Not so with Little Joe. It appeared as though the airspeed and heading readings were painted on the instruments. The L-2 was making corrections quickly, smoothly and precisely. With such competent flying, I found myself with plenty of time to make the engine and navigational adjustments. Relaxed in the seat, I picked up the mike and said "Good-day" to the gentlemen in the tower. Never before had I enjoyed so much leisure time at this stage of a flight. And never was I able to devote as much time to observing other traffic in the area.

In glancing at outside air temperature, I saw it reported 85 degrees F. Perhaps I better adjust the climb for a faster speed to keep engine temperature within the green. This was accomplished with just a slight adjustment of the controller pitch knob. The airspeed needle rose to 100 mph and hung there as if glued.

Upon reaching 5,000 feet, a few minutes later, I rolled the pitch knob clockwise a few degrees. The 170 leveled out and now was outbound on the east leg of the Cleveland range. A check on the low frequency receiver revealed too prominent an "A" signal. Indicating a crosswind from the left, I simply rotated the turn knob of the L-2 controller and held it until the directional gyro read 85 degrees—a five degree correction. Then the knob was returned to the neutral or detent position and the 170 was flying level again and smack on the feather edge.

From there on, there was little for me to do. Little Joe held the gyro heading so steadily that at first I suspected it was caged. I stretched out luxuriously in the seat and picked up my navigation kit. To amuse myself

Sharp flying and precision techniques are Little Joe's specialties, particularly on a GCA approach.

# MY CO-PILOT WEIGHS 36 POUNDS

By TED DUROSKO

I laid out a course from the intersection of the east leg of the Cleveland range and the northeast leg of the Akron range to Port Erie, Pa. The distance measured 75 miles and the heading was 45 degrees. Along the course line I marked off graduations every ten miles. As soon as I established the intersection, the Cessna was changed to its new course by a simple twist of the turn knob. Over the first two check points I added a few degrees for wind correction and at the same time clocked the ground speed. It was a delightful experience to let Little Joe wrestle with the controls while I watched the check points come up on schedule.

Little Joe held the 170 on a track that duplicated the pencil line I had drawn on the sectional chart. The destination of Port Erie passed under the nose of the Cessna within 30 seconds of my ETA.

On the return flight to Cleveland I found opportunity to give the L-2 a severe test. A valley which runs north and south cuts right through the heart of Cleveland. In the valley or "flats" are located steel mills and other heavy industry. When the wind is from the north, the cool air from Canada is blown into the valley. This cool air meets with the heated air radiated by steel mills and the result is mean turbulence.

Approaching the valley from the north and out over Lake Erie, the gyro read 180. Little Joe worked quietly and quickly to maintain the setting. As the Cessna tracked a course over the valley, turbulence pounded on first one side of the airplane and then the other. The 170 bucked and was buffeted. By this time I had slowed the Cessna to 95 mph. It was still rougher than rough yet the nose of the 170 held faithfully on the heading of 180 degrees.

To make a comparison check, I flipped off the engage switch. The L-2 rested while I tried to guide the airplane over the valley. Immediately one wing flipped up, I made the correction; the other wing came up; the seat pounded the underside of my pants. The Cessna fishtailed, Dutch rolled, and the engine over-revved and under-revved. On the panel the gyro reading swung from side to side.

This was enough to convince me that the L-2 could do a better job than I. While the autopilot cannot lick the turbulence, it certainly smooths out the crests of the gusts.

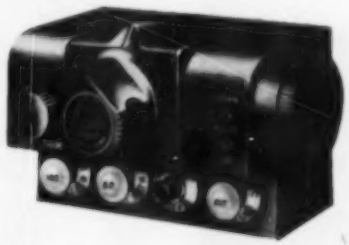
I learned about other desirable characteristics of the L-2 during flights made on subsequent days. Two points caused me to raise an eyebrow in surprise. First, because of a mechanical torque limiting clutch used in the servo assemblies, the human pilot can override the autopilot if the need arises. Little effort is needed, and the ship responds immediately to the touch of the human pilot.

Second, the pitch trim of the airplane is set automatically. Regardless of whether the airplane is in a climb or glide, wheels or flaps up or down, or how the airplane is loaded, it is in proper trim.

This is accomplished by a conscientious little midget called a trim tab servo motor. Acting in response to signals received from the amplifier, this unit keeps the airplane in correct pitch trim by compensating as required for every attitude change. This assures the human pilot that when he chooses to disengage the L-2 autopilot, his ship will be in perfect pitch trim—that is with a no-load condition on the elevators for manual flight.

In keeping with the practice to have the airplane in trim at all times, components for the L-2 can be mounted so as not to affect the CG. On the control column is located the engage switch and the controller is mounted on the panel just above the throttle. These are about the only two components that a pilot normally will see.

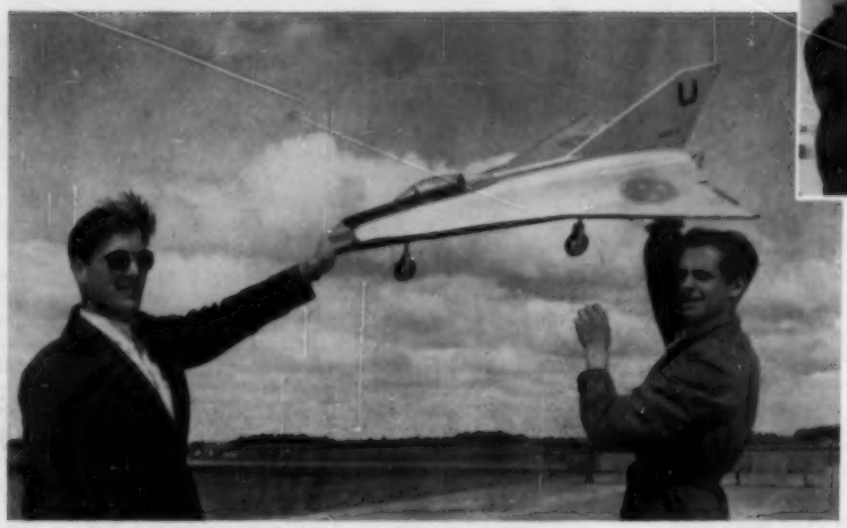
Behind the panel and mounted on the directional gyro is an electrical "pick-off" device fastened on the gyro gimbal. This device "notifies" the autopilot whenever there is a deviation from a pre-set course. Likewise a pick-off device is mounted on the attitude gyro to sense deviation in roll and pitch of the airplane. The electrical pick-off impulses are then fed to the "brain." This is an electronic amplifier, about the size of a loaf of bread, which analyzes while amplifying the signals from the gyro pick-offs and the controller. After being analyzed as to magnitude and direction (this happens instantaneously), proper signals are sent to the "muscle."



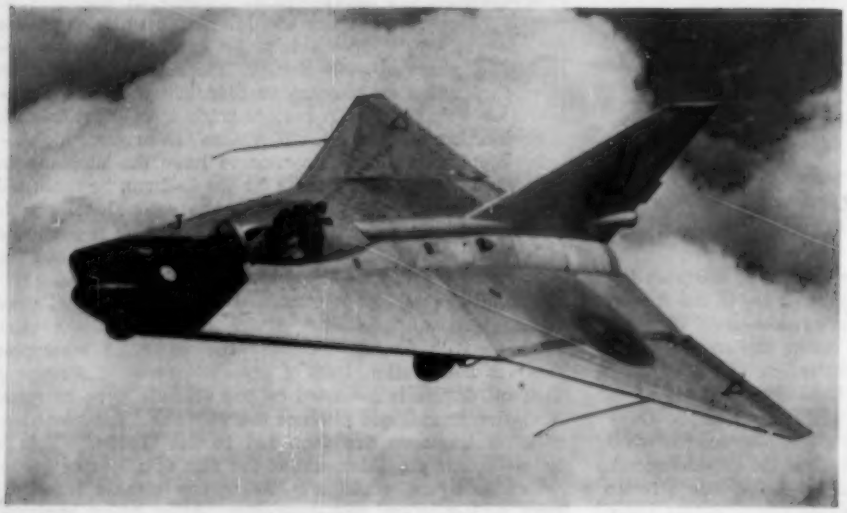
Author's co-pilot was an L-2 Autopilot in a Cessna 170 with this type of control unit.

This unit which actually moves the controls is known as a triple-axis servo. In response to signals from the amplifier, the electric servo motor supplies the force to operate the ailerons, elevators and rudder. When the autopilot is disengaged, a magnetic disconnect clutch separates the servo cable-drum from the servo motor, leaving the control surfaces free for manual operation.

To complete the system, are two more components. One is the dynamotor which furnishes 250 volts for the AC and DC amplifier stages. The other is called the "follow-ups." This is a variable voltage two-phase transformer directly coupled to each of the control surfaces of the airplane. The main function of this unit is to supply control surface displacement information to (*Continued on page 52*)



Left: The U-Control-It model of the Swedish *Draken* and above: the same model in flight.



The half-scale SAAB 210 *Draken* in slow flight. Spots on the right wing are airflow tufts to check on turbulence.

Full-scale model of the SAAB *Draken* all-weather delta fighter. Note deep center wing section and thin, "unswept" outer wing panel.

*The Flygvapnet, the Swedish Royal Air Force, needed an all-weather fighter. Here is an account of the evolution of*

# SWEDEN'S DOUBLE DELTA

By MICHAEL GLADYCH

THE FIRST AMERICAN delta—the Convair XF-92A was already two years old when Sweden decided to drive into the sonic barrier. With no delta fighters yet available on the world market, Sweden had to build one, and the order went to Svenska Aerolan Aktiebolaget (SAAB)—the only Swedish plane manufacturer. A small company, as aircraft makers go, SAAB took the new assignment in stride. Within five years, the SAAB *Draken*—Sweden's Mach 1.5 delta all-weather fighter—greased down the runway at the Linköping factory field.

In spite of the record time of its development, the *Draken* is no bargain basement plane. In some aspects it is even superior to many deltas aloft today. Powered by a Swedish built Rolls Royce, "Avon," axial turbo with afterburner, the *Draken* has approximately 10,000 lbs static thrust. It carries a search radar and 30 mm cannons, plus a battery of air-to-air guided missiles. The pressurized cockpit and the amazingly low power loading of 2.5 lbs/lb of thrust gives the *Draken* a fighting ceiling of over 50,000 feet and a rocketing rate of climb.

The radical 78 degree sweep of the center wing section is the sharpest yet attempted in supersonic design. Our Convair F-102, for example, is swept to only 60 degrees. And while the Convair delta has a thin airfoil to keep it within a high critical Mach number, that extra rakish sweep angle of the *Draken* allows for more wing depth. Of course, the thicker the wing, the easier to beef it up for transonic buffeting. Furthermore, the wing space makes room for internal fuel tanks and gives better spanwise weight distribution.

However, the desirable high speed characteristics of a sharp sweep become a pilot's headache at low speeds. And a low landing speed is a must for any Swedish jet. Sweden's $15,000,000 Air Force budget has no room for runway extensions, regardless of how hot the *Draken* may be at altitude. So, to make sure the *Draken* could slow down from its 1,000 mph level speed, Lars Brising, chief of SAAB Engineering, his assistant, Erik Bratt, and the 500 men working on the *Draken* project, devised an unprecedented applied research program.

In the preliminary design stage, they "unswept" the outer panels of the *Draken's* wing to a moderate angle of 53 degrees. Naturally, to stay within the same high critical Mach number as the center section, the outer panels had to be honed down sword-thin. The span of the thin wings was short, however, and the structural problems were solved. They called this configuration a "double delta."

With electronic computers and their modern wind tunnel, the *Draken* team could follow an orthodox course of plane development. But even the most recent electronic "brains" make mistakes which must be corrected on a prototype. Such corrections could take millions of dollars and years of time. Sweden was short on both so SAAB sneaked through the dollar-time barrier by literally making the *Draken* design grow in steps.

Satisfied with the configuration, they built a pint-sized scale model, powered it by two toy pulse jets and tethered it to a "U-control" harness. The little *Draken* could now take off under its own power, climb, glide and land—all of this under the eye of a movie camera mounted on the tethering post. Now, necessary design corrections could be made quickly and with little expense. Also, Bengt Olow, SAAB's chief test pilot, could watch his new plane fly from the safety of the control post.

The tethered testing was a success and the next step was an advanced scale model. This time, the original model grew to half-size of the final dimensions. Powered by a real turbo—an Armstrong Siddeley *Adder* of 1,050 lbs static thrust, the "junior" was outfitted with internal cameras and an oscillograph to watch its flight behavior while Bengt Olow put it through its paces.

Although the plane was capable of about 350 mph straight and level, the accent was still on slow flight characteristics. One of the worries was the center of gravity (C/G) travel, due to fuel consumption. The fuel tanks were of necessity distributed along the longitudinal axis and a considerable weight shifting could be a real hazard, especially on landing. To see how this would affect handling, the "junior" (SAAB 210) had a system of two ballast tanks with a high capacity pump between them. In flight, the test pilot could pump liquid ballast fore and aft thus moving the C/G at will.

The project team took only 18 months to build the SAAB 210 at a cost not worth mentioning as plane building usually goes. During 500 flights made by the "210," its slow speed characteristics were proven practical and only one major modification was required—that of the air intakes. Again, the time and expense of alteration was only a fraction of what it would have been on a full size prototype.

Its "growing up" process completed, the full scale SAAB-35 *Draken* was built and is now undergoing flight test. But while it "grew," it yielded much important data that will shorten the test period before it goes into mass production. Thus, the *Flygvapnet*—the Swedish Royal Air Force will get its double delta on the double. END

THE PRO'S NEST

*If your plane stands unused for several months, then for safety's sake, it behooves you to*

# Give your gas a break

By FRANK SPEIR

WHEN I FIRST THOUGHT about buying an airplane, I asked my old instructor what he considered most important for cross-country flying. His answer was, "A lot of gasoline, so you will have plenty of margin to lick bad weather." His advice has always stuck with me, and my present Bellanca *Cruisemaster* has an extra 25 gallon fuel tank in the fuselage. While it is additional weight to carry about, it adds greatly to my peace of mind. On two occasions it definitely has permitted my return to landing fields which were open, when weather forecasts had let me down badly.

The balance of my plane in flight is such that normally I run on the main fuselage tank until it is dry, then switch to the right wing tank, and finish off, if necessary, with the left tank. Of course, I do not run the last one very far down. In fact, for a considerable time last autumn, I never turned it on at all—just checked before every trip to see that it was full.

Returning one day during this period to my home field in Detroit, I switched to the left tank some ten minutes before landing. A few days later, I had to make a rush trip to Toledo and, knowing there was enough gas aboard for that short distance, I took off without refueling. Even before I got out of the traffic pattern, my engine started to pound. and one cylinder cut out. I called the tower and yelled something about, *"Gangway! Bellanca eight nan coming down fast."* Even before I could get into position to land, another cylinder quit. While I actually had a fair amount of altitude to spare, there was lots of reason for worry as I maneuvered through traffic into final approach.

I taxied to the repair hangar, counting my blessings. They checked the engine, and found several sparkplugs—including both those in the two dead jugs—with their tips knocked together. Some pointed remarks were made about owners who don't check their engines often enough between hundred hour inspections. New plugs were installed, and the Lycoming run up. It worked fine.

I lined up once more for take-off, gunned the throttle, and started rolling. Within a hundred-odd feet, before the tailwheel came off the ground, a cylinder cut out again. The man in the tower approved my taxiing back, in a tone of voice that clearly indicated he thought it high time I put my wreck on the nearest salvage dump—or at least did something drastic to it!

Again, the sparkplug points were mashed together, just as though they had been beaten with a hammer. Furthermore, an inspection by gooseneck flashlight showed the top of two pistons to be covered with small indentations, as if they had been deliberately shot-peened. After much consultation among mechanics, it was concluded that gravel, or some other hard particles, had worked up through the air induction system to the carburetor, and been drawn into the cylinders. It must have been something hard banging about inside the combustion chamber, they agreed, to have caused all those marks. And what else, they asked, could have damaged the sparkplug tips so completely? Hence, two cylinders were removed and, after that, the entire air ducting to the carburetor. Not a sign of any foreign material was discovered, but it was found that the interior of the cylinder heads were also "shot-peened" in the same manner as the piston tops.

The Regional CAA office sent its maintenance inspector, but he could offer no explanation other than to say that whatever hard objects had gotten into the cylinders, must later have been blown out through the exhaust.

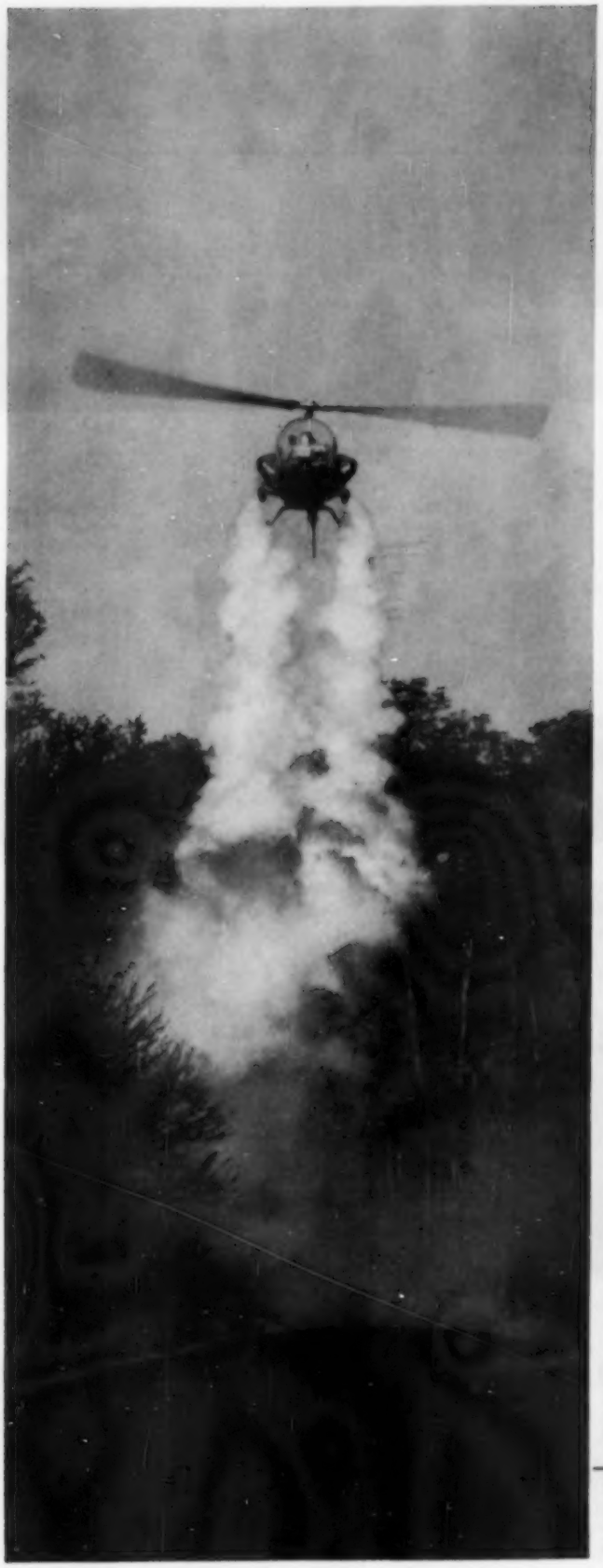
At this juncture, I sat down to analyze all the known facts. The probability of pebbles getting sucked into the cylinders was extremely remote; that the original ones should disappear, others get sucked in, and then also mysteriously disappear—well, it was just out of reason. The one non-routine thing I had done this morning was to switch to the rarely-used left fuel tank. Perhaps I had bought a batch of bad gasoline? I asked the lads about this, but all hands agreed that, "never in a thousand years could poor fuel cause all that damage."

Nevertheless, on a hunch, I drained the remaining fuel out of the left tank and put it into my Packard. Within a very few minutes, the detonation in the car engine was extremely marked. As far as I was concerned, the mystery was solved. Back went the Bellanca together, the tanks were filled with fresh gasoline and *that* was the end of the trouble.

Detonation-marked piston resulting from high gum content of gas stored in plane tank for over four months, making it impractical for use.

Of course, I was extremely indignant about the "bad" gasoline I was sure someone had sold me. I searched my records thoroughly, but couldn't pin down the brand of fuel that had been put in the left tank, much less the dealer from whom I purchased it.

My work brings me in daily contact with experts in all phases of the automotive industry, but it was some time before I happened to mention to a fuels and lubricants engineer my experience with the Bellanca. In a few minutes, he explained to me a great deal I didn't know about modern-day gasolines and, quite effectively, laid upon my shoulders the blame for my plane's mishaps. All I could bleat when he finished was, "Why didn't somebody tell me that before?" Let (*Continued on page* 54)



*Crop-destroying insects cause great economic losses in farm crops, hence agricultural aviation finds that*

# BUGS ARE BIG BUSINESS

By M. D. BELLOMY

NO ONE HAS YET plowed a field with an airplane but there are few other farm jobs that planes have not done.

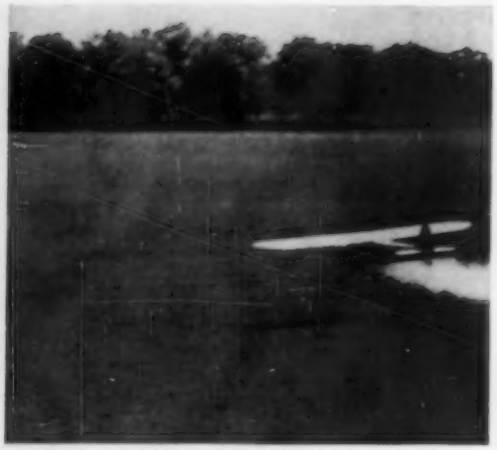
One out of every 12 acres of land under cultivation in the United States is treated in some way from the air. In a single five-year period crop-dusters have dropped more tonnage of seed, dust, spray and fertilizer than the U. S. Air Force fired in bombs, rockets and machine gun bullets combined during World War II. In any given year some 100,000,000 gallons of liquid sprays and 700,000,000 pounds of dust chemicals are spread over this nation's crops by agricultural aviators.

The airplane has become so useful in the fight to control insects that 7,700 have been equipped especially for that purpose. In fact, the number of aircraft assisting the American farmers exceeds the combined number of all scheduled airliners plying the world. Agricultural aviation, although it did not come into its own until after World War II, is not new and is no passing fad. As early as 1918, poison dust was dumped from airplanes onto crops in an attempt to control insects. Three years later, a specially equipped plane dusted an infestation of catalpa trees near Dayton, Ohio, with unusual success.

In 1924, an entomologist from the U. S. Bureau of Entomology and Plant Quarantine, Dr. B. R. Coad, borrowed two planes from the Air Service and applied dust to cotton fields near Tallulah, La., in an attempt to lessen destruction caused by the boll weevil. At that time, the annual food bill for this insect was averaging over 250 million dollars. Dr. Coad was elated with the success and speed of the operation and reported, "It was at least 100 times as fast as the best mule-drawn machine."

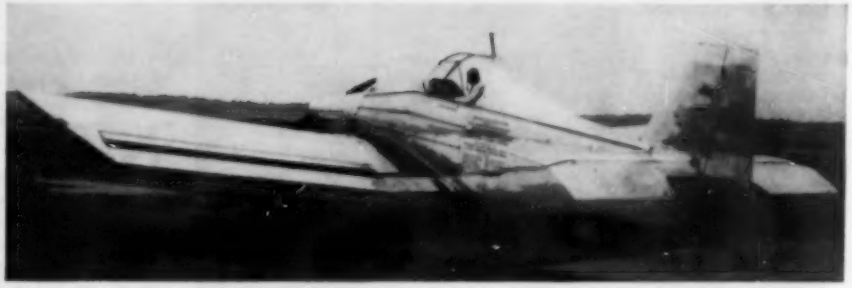
One year later, the industry that had cut its teeth only

Bell helicopter distributes a DDT-laden aerosol fog over woodland near Old Forge, N. Y., in an attack to rid the vacationland of Adirondack black flies.

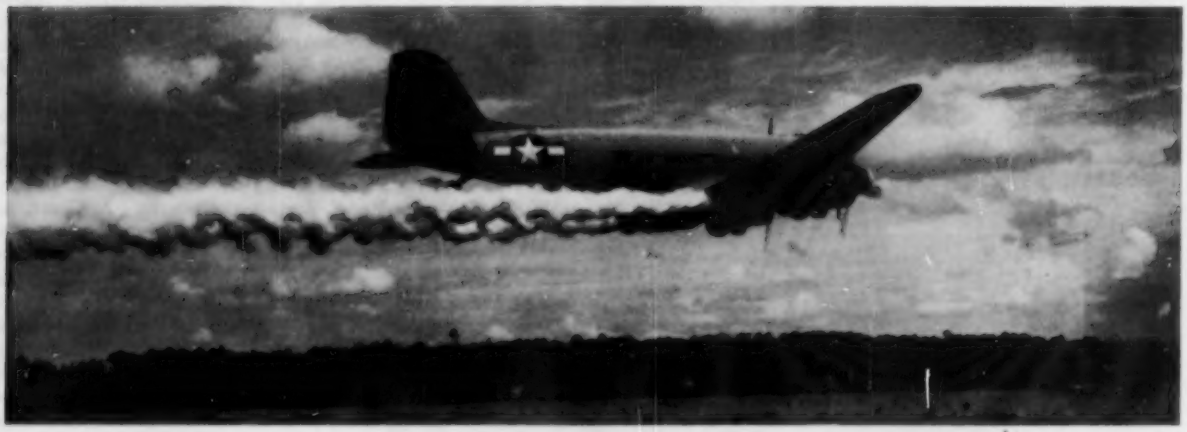


The first airplane designed exclusively for agricultural use, the AG-1 was constructed under CAA contract at the Personal Aircraft Research Center of Texas A. & M. College.

▲
Crop-dusting is not new. In the '20's the U. S. Bureau of Entomology and Plant Quarantine used planes to dust blueberry fields in Maine (top) and later the autogiro (shown below dusting beans) was used in the belief that slower forward speed would improve coverage.



Dusting isn't restricted to lightplanes. A C-47 spreads DDT with exhaust generated sprayers.
▼



six years previously, began to grow up. Huff-Daland, Inc. began commercial dusting throughout the south.

Although agricultural aviation matured in this country, control of insects by aerial treatment was tried in Germany almost 50 years ago. In 1911, a German forest warden applied for a patent covering "the use of aircraft in combatting forest pests." His excellent idea aroused little interest and no support. Fourteen years elapsed before the Germans again tried an aerial assault on insects. Then, a stand of timber was treated to suppress an outbreak of the nun moth. Officials were excited at the results, reporting, "Excellent, with no apparent harmful effects on birds or game." In the same year, the Russians tried airplane dusting to control locusts and the French treated a forest plantation.

During the next 20 years, almost every imaginable kind of experiment was made by various types of aircraft equipped with special distributing devices. Old and new

▲ In formation at three feet, *Cub* J-3's cover a wide swath of Illinois peas.

▲ A Stearman laying insecticide along marshy area of a Tennessee Valley Authority reservoir margin. Note low altitude, irregular dusting area, tree hazards in background and absence of safe forced landing space.

▲ Bell agricultural model helicopter, shown spraying city garbage dump, was enlisted in the fight against infantile paralysis in Buffalo. DDT was used to kill the common house fly, thought to be polio transmitter.

▲ Two Stearman dusters make a low pass across a field on an Illinois farm.

sprays and powders were tried and re-tried, wetting devices to assure better powder adherence to foliage were tested in New England, autogiros and a blimp were used in the belief that their slower forward speed would improve coverage. But, during that entire trial-and-error period, few major improvements were actually recorded. The real potential of the airplane as an insect-control agent remained obscure until the early part of WWII.

At that time exposure of troops to insect-borne diseases was quickly recognized as a primary factor contributing to the defeat of any army, modern or otherwise. A solution to the problem challenged the initiative of all—entomologists, chemists, scientists, military leaders. They finally found an answer to that challenge—"broad sheets of DDT spray, blanketing otherwise inaccessible insect-breeding areas." The answer saved countless American lives and millions of dollars, and ushered in agricultural aviation as a giant industry. (*Continued on page 70*)

# SOARING CHAMPIONSHIPS

Beneath an ideal soaring sky, pilots and crews ready their ships for launching in the 22nd National Soaring Contest at Harris Hill.

ALL WINTER, IN WORKSHOPS, cellars and barns, the nation's thermal riders have been preparing for the new season.

This year's National Soaring Contest, the 23rd, is to be held at Grand Prairie, Tex., from July 31 to August 9. The seasoned eagles—MacCready, Ivans, Schweizer, Bennis, and the rest will be there with their standard jobs. But also jockeying for a turn behind the tow planes will be a new man or two, hopefully strapped into a machine of his own creation, or modification.

Such a man and machine appeared on the line at Elmira's Harris Hill last July 5th. The man was Kempes Trager, from Detroit.

The ship? Well, it wasn't anything anyone had ever laid eyes on before. It had an LK spar. The wing was high and well doctored with dihedral. The tail looked as though its builder had been around *Bonanzas*. The fuselage stood high, a whole wheel diameter off the earth. Obviously the designer of this thermal thief had thought far ahead about forced landings in rough places.

Let's listen to Kempas Trager, the winner of last year's national contest, talking: "No, she didn't just happen. She was the end-result of 20 years of effort, two gliders, and a lot of serious thinking.

"Each feature of the *Alibi's* design is a compromise between ultimate performance in the air and ease of handling on the ground. I refer to penetration, ability to extract the most out of a thermal, or to sit down with impunity in a stone-strewn field. I also refer to assembly by the crew—which can be accomplished in 10 minutes by two men."

These devotees of silent flights are not miserly with their contest preparation time. Trager says that 500 hours of personal effort went to finishing his ship's surface. Time went into other changes: the wing aspect ratio went up to 16-1; the built-in twist was mostly taken out; the landing wheel was made retractable; the butterfly tail was built.

Finally, too late to allow for testing, Trager drove his last tail rivet, loaded *Alibi* onto her new trailer, and headed for Elmira, 460 miles away.

He explains, "It had been three years since I sat in a glider. My ship was untested. I figured she'd get tested as well in contest flights as any other way."

Arrived on the Hill, there were the usual details: ground crew instructions, barograph to calibrate, maps to collect, drinking water, take-off cards, landing cards. But, finally the tow rope tightened last July 5th and *Alibi* was airborne in pursuit of the 17 contestants who had scaled up in advance. The flight-fight had started.

Let's follow, day-by-day, the stern chase that *Alibi* and Trager put up to win their championship.

July 5th—1st Day: This was a "task day" with assignments fixed by the Contest Board. Two goals were offered, both in a NNE direction. The more distant objective was 244 miles across the Berkshire hills into Massachusetts;

# COME HARD

**Twenty years of effort paid off for Kempes Trager and the untested ship he built and entered in the National Soaring Contest.**

**By EDWIN D. MERRY**

the nearer choice was 147 miles, near the Hudson Valley in New York State. All pilots achieving their goal would get distance points (one point a mile) plus 20 per cent bonus for reaching the goal.

This was a day of budding cumulo nimbus. Pilots who got towed off early had the advantage. Stan Smith, for instance, flying a Schweizer 1-21, made 208 miles on course. He went down one thermal short of the far goal.

Says Trager, "I knew almost at once this was not our day. We were more than a little tail-heavy. I had to loosen the shoulder straps and lean forward to keep the nose down. I decided to sit down in an easy spot, get the lead out of her tail, and hope for a better go tomorrow."

Top standings at the end of that first day were: S. Smith, 208; See, 196; Goodhart, 174; B. Smith, 169; Opetz, 142; Ivans, 133. Trager, with 32 points, was second from the bottom. (27 pilots had registered.)

July 6th—2nd Day: This was an "open day" which meant that pilots had to size up weather conditions for themselves. Each had to name his own goal. Every task day was followed by a pilot-choice day.

This was the weakest day of the meet. Trager decided to take this break to correct *Alibi's* tail-heavy condition. Out came the tail cone and three pounds of lead ballast. In the check hop, *Alibi* flew hands off. This second day became a contest day when Paul Schweizer and William Ivans picked up 35 and 36 points respectively.

July 7th—3rd Day: A task day. The Du Pont Airport, 177 miles ESE of Elmira was the objective. The Contest Board was obviously trying to separate the men from the boys. They threw in a speed factor, trying to tempt pilots into risking a short cut over the Pocono ridges. Trager disregarded the speed bonus and played it safe by winging down the Susquehanna valley and across. He was last of six pilots to reach the goal; 29 had started.

*Alibi* and her crew jounced over the roads all night and barely beat the sun back into Elmira. At the end of this third day's flying the score stood: 1st, S. Smith, 426 pts.; 2nd, Goodhart, 422; 3rd, Ivans, 396; 4th, B. Smith, 390; 5th, See, 302; 6th, Schweizer, 299; 7th, Bennis, 286; 8th, Coverdale, 273; 9th, Carris, 256; 10th, Trager, 255.

July 8th—4th Day: An open day. Weather fair to good. Nick Goodhart, the English ace, named a goal of 169 miles to Troy and made it. This put him solidly into first place. *Alibi* had to surrender her declared goal of Duanesburg, N. Y.; the drift was too strong to hold the course. Trager finally gave the ship her head, and she raced along to land at Dodgeville, N. Y., good for 130 points. No bonus! The score at the end of this day found Trager's position only slightly improved. The big blackboard on Harris Hill listed him ninth. (*Continued on page 64*)

National Soaring Champion Kempes Trager in the cockpit of his sailplane "Alibi" and, below, receiving an award from Stan Smith, former National Champion.

Don Schumacher lands at the 80,000 acre Bar Bell Ranch along the Snake and Salmon Rivers. The Smith brothers, operators of the ranch, can locate cattle in a few minutes, by flying with Don, as compared to the days it would take on the ground.

Above: Don picks up mail and next week's grocery list left in the "mail box" attached to home-made wind sock at the Billy Creek Ranch.

EVERY TUESDAY BETWEEN November 15 and May 31, Don Schumacher, a pilot for Hillcrest Aircraft Corporation of Lewiston, Idaho, flies mail, groceries and people on a regular run up the Snake and Salmon Rivers.

Don is a product of the G. I. Training Bill and one of Hillcrest's five pilots whose primary job is aerial spraying during the summer. As a side line, Hillcrest services ranchers, particularly those most remotely located. Uranium hunters also are now coming in for a share of Hillcrest's attention.

Schumacher's project is run on a subscription basis, for which each of seven present subscribers pays a fee of $12 per month. Each subscriber is allowed 20 lbs. of cargo per week and a charge of 3 cents per lb. is made for cargo above the 20 lbs. Passenger fare each way is $6 on regular Tuesday trips. For special trips, charter rates prevail. The

Right: Landing at Billy Creek Ranch on the Salmon River must be made uphill and the take-off downhill, an impossible feat in a strong wind.

# Up Snake River

*in the wild "bush country" of Idaho, ranchers eagerly await the weekly plane bringing mail, freight and passengers.*

By BOB and IRA SPRING

route covers approximately 100 miles but a round trip normally takes about four hours, as the pilot lingers to talk with ranchers. The project has been in operation for seven years of which Don has flown the last four.

The route can be flown with surprising regularity but sometimes the canyons funnel winds too violent for landing. Overcast occasionally drifts below the canyon crests but Don knows where to turn and twist.

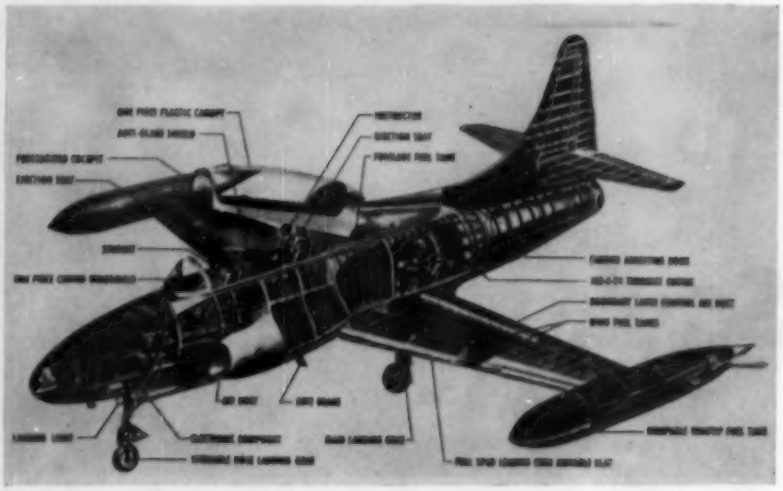
To call his landing spots "airstrips" is certainly stretching the imagination. Any half-level place on a hillside minus rocks and bushes will do. In one spot he even lands and takes off in a half circle.

Don would laugh at you if you called him an "angel of mercy" but one of his emergency night flights to a bonfire-lit spot on a canyon ranch has been called "unadulterated flying genius". "It's what you get used to," says the grinning Schumacher. END

Above: Schumacher flies down Snake River in his sturdy Stinson.

Right: Cecil Smith and his daughter, Pauline, greet Don after he landed his plane on the 600-foot Bar Bell Ranch airstrip.

**SEASTAR** Right: Navy's two-place trainer the Lockheed T2V-1 *SeaStar*, is the first jet trainer destined for carrier duty. Note particularly that it has boundary layer control to increase lift and improve wing performance, piping air out over the trailing edge to boost aerodynamic efficiency. The TV-1 is the first U. S. airplane ever ordered into production with boundary layer control as standard equipment. The plane is rated in the 600 mph class and the landing speed of 97 mph is very slow for a jet. Note in the cutaway the elevated rear seat for instructor, leading edge slats for stall protection, and location of the boundary layer control ducts.



**PERCIVAL P.9** Left: Especially designed to meet the needs of operators in Australia and New Zealand, this new agricultural plane, built by Edgar Percival Aircraft, Ltd. of England, features unrestricted visibility for the pilot on takeoff and in level flight. Made of welded steel tubing covered with fabric and powered with a 270 hp engine, the P.9 can carry a useful load of 1,825 lbs., cruise at 122 mph and take off and land in surprisingly small areas.

**BRITISH CONVERSIONS** Right: Making a British turbo-prop transport out of a piston-engined American Convair 340, the firm of D. Napier & Son, Ltd. of Luton, Bedfordshire, England purchased the plane from Convair and installed Napier *Eland* turbo-prop engines. Object of the conversion, in which the American company has shown interest, is to step up the plane's performance and, if successful, to place the British engine company in the line-up for competitive bidding on future large scale conversions by U. S. and foreign airlines.

# HAVE YOU SEEN?

**ROTORCYCLE** Above: Weighing less than 500 lbs. fully loaded, this tiny, one-man helicopter, the XRON-1 *Rotorcycle* built for the Navy by the Gyrodyne Co. of America, Inc., St. James, N. Y., can be folded into a small package for easy transportation. Its novel feature of coaxial, or counter rotating, rotor system gives excellent flying qualities with high efficiency.

**MISSILES** Right: The new version of the Martin *Matador* tactical missile TM61B is longer and carries a larger nose section than the present version. For tactical missions, the TM61B will have an entirely new airborne guidance system. About the same size and weight as a jet fighter, the *Matador* is launched by rocket from a 39-ft. mobile tandem axle semi-trailer. Below: The first intercontinental guided missile to be unveiled by USAF, the Northrop *Snark* SM-62 is undergoing tests at Patrick AFB, Fla. The winged pilotless bomber, capable of delivering an atomic warhead over transoceanic distances, has made a 2000-mile flight, longest announced to date.

The author, Lindy Boyes, as she appeared on her first solo in a Hiller 12-B helicopter.

# I SOLOED A COPTER

**A fixed-wing airplane pilot gets some brand new flight experience in handling a helicopter.**

**By LINDY BOYES**

PAT YOUR HEAD and rub your tummy at the same time and you'll get an idea of what it's like to fly a helicopter.

Since I was the first woman student to be trained at Hiller, I was a curiosity. Experienced pilots were gentle to inform me that eight hours would not be likely to solo me—and that's all the time I had coming. So, not to waste more time than necessary on cockpit procedure, I first digested the book—Hiller, "Flight Manual for Model 12-B."

My introduction was on a Monday morning. After a plant tour, I was turned over to Dick Peck and led to the craft for a pre-flight inspection. The mechanic, Larry Watson, I soon learned, checked the plane after every flight so my perfunctory first inspection was also my last.

I took the middle seat—the 12-B seats three across—while Dick sat at the left. There are dual sets of controls at the left and middle seats. The flight line parking area was marked with white squares painted at regular intervals. The squares were enclosed by large orange circles. Dick said the squares were for staff pilot landings and the circles for the novices. When he started the engine, I realized he was joking, as the whirling blades overhead prescribed a concentric circle with the one on the ground. The orange circle meant to stay out or go in low.

Lindy, with instructor Dick Peck, discuss her first flight in the Hiller helicopter.

The cockpit deserves special mention. There are rudder pedals for directional control as in an airplane, and a stick for forward, backward and sideward movement (the cyclic control stick). A second stick (collective control stick) actuates the up and down movements of the craft. It is at the left of the pilot and on the handle is the throttle, as on a motorcycle. This permits changing throttle setting as the collective stick is raised and lowered.

And then that elevator ride. Up we went, down went the nose and off we scooted along the turf runway four feet above the ground. As airspeed built up, we started climbing. Dick finally leveled off and told me to handle the rudders and the cyclic stick (the one in front) and he'd keep track of the collective (at the side). I maneuvered the helicopter through the air. It flies like an airplane, I thought, while making "S" turns down a railroad track and 360-degree turns . . . just like when I was a student in the old-fashioned fixed-wing airplane.

Then Dick traded sticks with me. Now I had the collective with the throttle. I pulled the collective up and the rpm plummeted below the red line. Ooops! I added power by turning the throttle handle to the left and the needle shot up beyond the maximum red line. Then I suddenly realized that I had lost 500 feet of altitude to boot. Concentrate, I told myself. With a light hand on the throttle in mind, I worked at maintaining a constant altitude.

A few minutes later I was handling the three controls of the ship. I had read the book, I kept telling myself, so with forward (*Continued on page* 48)

# I learned about flying from that !

*The author found out that no one worries about a pilot except the pilot himself in either military or civilian flying.*

By JOSEPH A. POLLACK

I FIRST LEARNED NOT to trust anyone upon the occasion when I had a forced landing in a Taylorcraft. The incident wasn't serious because the engine cut out over an airport, but the ship should never have been airborne in the first place.

Three times the operator started the engine on the ground and each time it cut out. He had changed the throttle arm so that it had a very short travel and when the throttle was reduced to "idle" the carburetor simply starved. After three attempts to keep the engine alive, wouldn't you think I'd know enough to refuse that ship? But not I!

Blissful in my confidence in the operator, I zoomed off into the blue to practice spiral landings. I didn't like spiral landings—still don't. But, there I was, doing them and undershooting every one. Three times running I had to gun the engine over a housetop on final approach to the runway.

On the fourth attempt the engine sputtered out before I entered the 360. This time I didn't dare undershoot. I pulled in on the base leg and even then had to cut a corner to get in on final.

Pretty soon the operator came scooting out in a car, full of agitated curiosity. I gave him the low-down. Then he taught me about flying. Up we went—in the same klunker. He didn't wait for the engine to cut out. Instead, he throttled back on the base leg of a 180 side approach and showed me how it should be done. None-the-less, while taxiing back to the hangar, the engine cut out again and we had to push the plane to the ramp. The ship was grounded and stayed that way until the throttle rod was returned to its normal travel.

Joseph A. Pollack with the "wood prop cripple" which gave him some hair-raising thrills.

Several years later I was reminded for the second time to rely on Number One. As a military pilot based at Fort Sumner, N. M., I was sent to Tucumcari to pick up an AT-17 that had been left there by an Aviation Cadet. I asked the mechanic if the ship was ready to go and he indicated that it was. I climbed into the seat, threw on the battery switches and read the fuel gauges. The right tank indicated three-quarters full, the left tank read half full.

Then, remembering to trust nobody, I snapped off the switches and clambered out to give the tanks a visual check. In the left tank was only five gallons of gas. The right tank was so bone dry I couldn't even detect the odor of fuel.

I called the mech and asked if he was trying to deal me a black hand. He merely shrugged. I thought again of the operator who let me take off with the balky T-craft. Neither of these boys wanted to see me killed, but their necks weren't involved. It's the pilot whose neck is on the line and it's up to him to check and double check.

Once another pilot and I were to fly over and pick up an AT-17 at Amarillo, Tex. It had been left there with a dead battery. The other pilot drew the job, but because it was a wood prop cripple, he begged off. I agreed to ferry the cripple back. He made out the flight plan and drew the charts for the trip. We didn't draw any charts for me because I would fly formation with him on the return trip.

How many times can a guy depend on the other fellow without getting any the wiser? Let me finish. This lad flew me to Amarillo in jig time. He knew how to fly all right. A mechanic went along with us with a spare battery. He installed it in the crippled ship at Amarillo. My pal took off first. Me right behind him. I've forgotten how far along we were, possibly about half way to Fort Sumner. Those steel props proved too much for my friend. Why should he stay slowed down to my speed? He could go a lot faster and that is exactly what he did. I didn't have any charts, remember? So I watched him disappear into the horizon.

Now, there is a stretch of bad country between Amarillo and Fort Sumner. I was in the middle of it. Sumner was not equipped with a radio range, so the radio in my ship was of no avail. Of course, I might tune in some other range, but how would I explain that to the CO? I could picture myself saying, "Sir, I didn't have any charts with me, so I spent the night somewhere else." Doesn't sound so sharp does it?

I decided to carry on and held the compass heading my leader had been flying when he left me. After all, I could always use the radio. That was for an emergency.

Eventually the home field loomed up almost on the button. That wasn't bad navigation. So I called the tower for landing instructions. Only nobody hears me. My radio is dead. Well, I'll just enter the pattern at my own discretion. Nothing so exciting about that. I slow down and listen for the landing gear warning horn. No horn. That battery is deader'n a petrified fossil. Nothing for it but to crank down the gear by hand. I turned the crank until I was red in the face and warm around the collar. At the top of each revolution my head was on a swivel as I cleared myself for traffic. On the bottom of the crank I was blind because my head was so (*Continued on page 74*)

## OPERATION T-BIRD

AS SUMMER encampment time arrives for Civil Air Patrol Cadets, hundreds of them, from 15 to 18, will descend on various Air Force Bases.

Airlines, aircraft manufacturers, the Armed Services—all are hunting young people to run the many phases of aviation. CAP works on the theory that if you give the teenager a taste of the real thing enough will turn to the skies to fill the bill.

So off to Air Force bases all over the nation, riding in USAF air-lift, wing the Cadets. They live in barracks, eat GI chow, drill, go to flight simulator, weather, radar, rifle range and air traffic control classes; see every phase of the Air Force in action. AND—they fly.

Ask the Georgia cadets about last summer at Tyndall AFB, Florida; 258 strong, they had a turn topside in T-33 jet trainers and came down starry-eyed. Gene Noland, of Atlanta II Squadron, now planning an Air Force career, exclaimed, "Boy, that's for me. I felt like a king."

His pilot, 1st Lt. Gene Beckett, reported, "I'll take more like him. He's a Tiger Cub."

Thirty-seven Air Force pilots conducted the Cadet familiarization in jets: Escort Pilots and CAP senior officers bundled the students into Mae Wests, 'chutes and helmets and briefed them on ejection procedures. Maj. Howard Boettinger, USAF, Chief of Tyndall's Instrument Flight Section, was Operations Officer for the mission.

As a result there are 258 Georgia Cadets and additional oldsters who aren't afraid of jets, who are motivated to aviation careers, and who can find their way around a military base, with appreciation and "savvy."

—BETTY WOOD MC NABB

## I Soloed a Copter

*(Continued from page 46)*

pressure on the cyclic stick and a steady pressure on the collective, we moved forward at an even altitude. It worked! What seemed like a few minutes proved to be nearly an hour when we headed back home.

One hour down, and seven to go. We descended, aiming for a large white square on the turf runway. The 20-foot square, Dick explained, gave the student an objective for spot landings and the white perimeter line offered a guide for slow and low forward, sideward and backward flying practice. He hovered the plane a few minutes, then told me to do it. As I took a firm grip on the cyclic stick (Dick held on to the collective) the spot we had been over suddenly moved off to our left. I moved the controls to head back toward the spot. Where did it go? Ah, there it was behind me, then it was in front of me, and I was all around it and only over it in passing.

"You're moving the stick too much," Dick said, as I had by then moved the helicopter with no difficulty at all to quite some distance out of the white square. He retrieved the controls and demonstrated again the very slight movement required of the cyclic stick. I tried again. My area of operation became more confined to something like a square acre. Enough for the first lesson. Back to the parking area.

I felt sheepish about my wild gyrations while attempting to hover, but the fellows on the flight line and my instructor said that first hovering attempts were expected to cover the 40 acres around the landing strip. I wouldn't have disappointed them for anything.

The afternoon session indicated I had learned something in the morning. After warming up with some air work, we returned to the field to practice hovering and try some landings and take-offs. The second hour went by with flying the pattern around the field at 500 feet, maintaining 40 mph indicated air speed, 3,100 rpm and letting down to land in the white square.

The difference between a fixed-wing airplane and a helicopter shows up in the landing, in particular. In both planes you keep a constant airspeed in approaching for a landing. But in the helicopter at about 100 feet you start slowing the descent so that, by the time you are some ten feet above the ground, you are hovering. With a slow lowering of the collective stick, the plane goes straight down in a level attitude . . . still keeping 3,100 rpm . . . right onto the ground.

The airplane, on the other hand, continues its glide nearly to the ground before the pilot starts to let the plane settle in a full-stall landing. And an airplane lands when it is ready. The helicopter has an advantage—by flying in with power, you can't overshoot a landing spot; or, if you can (as a student I did find this possible), all one needs to do is back up and land on the intended

*(Continued on page 50)*

*a letter from Daddy*

TO: BOBBIE PHARES

Dear Bobbie:

Okay, okay—I'll relax! I guess you're safe alright, workin' in that Missionary School, teachin' them naked little cannibals how to sing civilized songs and wear britches. If I ever hear of you pokin' your nose into that African jungle, I'm gonna aim my trusty DC-3 toward Kilimanjaro and get you back to Dallas. Your 25 years, 5'4", 112 lbs., blue eyes and black hair would make quite a tidbit for one of them outsize primeval varmints!

You're a sweet and gentle girl and I'm pleased you're devoted to The Better Things. I'm also for Better Things, with the Very Best coming from Southwest Airmotive, the business pilot's Friend for 24 years.

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Love, *Daddy*

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SEE PAGE 55 FOR ADDITIONAL DETAILS


(Continued from page 48)

spot. Without power the helicopter has a slight disadvantage, but it's still possible to land safely. In fact, my instructor demonstrated so many "autorotation" (gliding) landings that he made it look easy.

Here again a 40 mph speed is maintained in descent . . . all the way down to ten feet. Then the collective stick is pulled up like a brake and the craft leveled off with the cyclic stick. As the helicopter settles on the ground in forward level flight, the collective is in full-up position. It sounds easy, but admittedly, I didn't easily get accustomed to the rapidity with which the last 25 feet approached at 40 mph.

As we used up more of my allotted eight hours of time, I began to enjoy this whirly-bird and to look forward to my solo flight. During my second day, a staff pilot asked how I was doing. I said I had been working on take-offs, landings and hovering. He looked at me with a benign expression and said I'd been making landings and take-offs, but it was really the instructor doing the work this early in the game. I couldn't think of a thing to say because quite possibly he was right—(even if I didn't think so).

The third day came and went and I had logged five hours of air work, landings, take-offs and hovering, hovering back and forth and over a spot. Over a spot, I say! Amazingly, the spot had diminished now to within the confines of the white square. And sometime in my sixth hour of flight I came in for a landing that we couldn't even feel touch the ground. Dick opened his door, took a good look, and said, "Yeh, we're on." If only all landings could be like that.

The fifth day rolled around and I had one-and-a-half hours to go. We took off once more in the same routine manner . . . warm up with air work then back to the field for landing practice, including autorotations with and without power recovery.

We'd been up and down for 30 minutes, seven precious hours gone, when Dick said, "Well, let's see you do it by yourself."

This was the moment I'd been waiting for! But when it finally comes, it's just hard to believe.

He instructed me to hover first, and he would wave me on to fly around the field and land. In the few minutes it took Dick to tell me what to do and get clear of the craft, I could see a group of spectators forming on the flight line. Larry Watson, faithful mechanic, was undoubtedly worried about his helicopter and was stirring up the troops for a final glimpse!

Grinning like a Cheshire cat, I went through the ritual of getting off the ground—slowly, don't jump off, I could hear Dick saying. I realized I was being let loose sooner than usual, and I didn't want him to get ribbed because of me.

Following instructions, I took off, hovered, went up and down and actually landed a couple of times. Up I went again. I took a look at the flight line. There was quite an audience by now. I was wishing Dick would signal me to fly around the field. As if he read my thoughts, he waved me on.

I lowered the nose and scooted off along the turf runway. As airspeed built up, I started climbing. And so my solo flight in a helicopter became a thing of the past. I was the first woman to get instruction at Hiller, and soloed in less time than any of their previous students. I guess Dick worked harder with me because I was a woman. END

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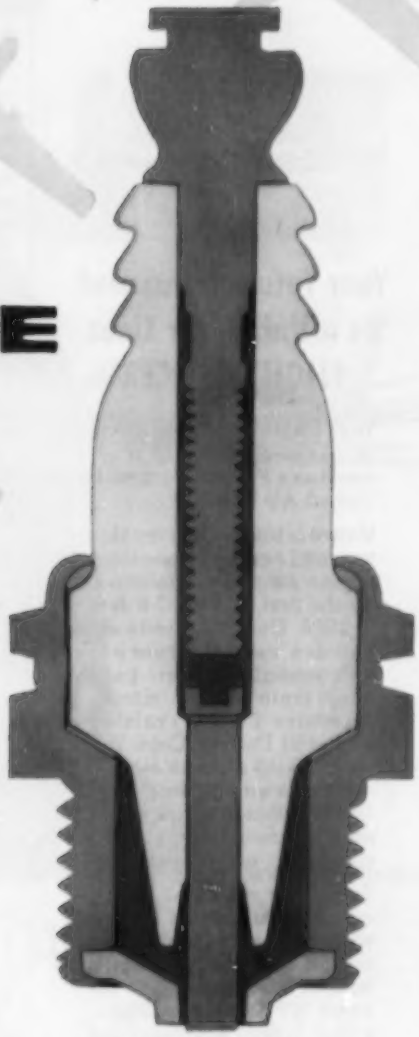

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## My Co-Pilot Weighs 36 Pounds

*(Continued from page 33)*

the amplifier to insure the return of the control surfaces to a neutral flight position.

Working together smoothly and instantaneously, the components of the L-2 autopilot blend into a first class co-pilot. Regardless of weather—it flies as sharply in the soup as it does in CAVU—I found that Little Joe performs procedure turns and let-downs that I could not match for precision. Likewise I didn't have to concern myself too much with gyro heading, needle and ball, airspeed, rate of descent and other factors involved in an instrument let-down. It was just a matter of feeding Little Joe the attitude I wished by setting the throttle and the L-2 controller knobs.

This characteristic of the L-2 was demonstrated when I picked up my friend at Windsor, Ont. His fishing trip over, he wired me to come north for a good fish dinner. From there we planned to go to Chicago for a brief business visit and return to Cleveland.

While on the leg from Windsor to Chicago, we ran into unexpected weather. Conditions had changed more rapidly than forecast. We were west-bound on Red 12 at 6,000 feet, and had passed over LaPorte, Ind. Ahead we saw a solid undercast with a top at about 5,000 feet.

Deciding to learn what was doing under the stuff, I called Chicago Radio. Hammond was down to 1,000 feet and Chicago was 900. At both places visibility was one mile. This called for a new flight plan. We asked Chicago Radio to change our VFR to IFR and included a request for a GCA into Chicago-Midway. Air Traffic Control quickly approved and assigned us to continue at 4,000 feet.

"Well," I said to Jack as I made ready to disengage the autopilot, "here's where I go to work."

"Nonsense," Jack said, "let Little Joe do it. Just reduce power and rotate the L-2 for a 400 fpm descent."

This I did and the 170 started down in a shallow and firmly-controlled path. Closer and closer came the cloud deck. As we clipped the tops and then settled into the grayness, I found myself reaching for the trim tab. But this was not necessary as Little Joe had taken care of even that little chore for me.

Upon reaching the 4,000 foot level, I rotated the pitch knob to level out the 170. After a power adjustment we just sat there—Jack and I—without much to do but look at each other. We couldn't see beyond the wing tips in the swirling grayness that engulfed the airplane. And yet I felt at ease—as though I were a passenger and a veteran airline captain was at the controls.

Twenty minutes later we reached the marker and made another descent to our assigned altitude. Then the GCA boys took over and started talking us in. Here is where I feel the L-2 offers its biggest advantage. It was so easy to make the identifying turns they requested by just twisting a small knob. I was mentally free to concentrate on their instruction. I need only to sweep-read the instrument panel and did not have to wrestle with the controls to maintain airspeed, altitude, banks and turns, level flight, etc.

Periodically the reassuring voice of the GCA operator came through the headphones: "Seven miles southwest of the airport." Then, "Past the loop area, descend to 1,800 feet."

Instruction came for another turn and then, "You are now on final approach for runway 13 right, six miles from touchdown—do not answer further transmissions—if no transmissions are received for a period of five seconds on final, execute standard missed approach procedure."

I shook my head in acknowledgment and patted the L-2 controller. If we missed the approach, I knew that a pull-up would be as easy as just adjusting the pitch knob while adding power.

Again the controller's voice sing-songed his message. "Three miles from touchdown, you are on course, on the glide path." A few seconds later he called for a slight correction in heading and rate of descent. A small adjustment of the throttle, and a small movement of the turn knob on the L-2 controller and we were back on the glide path. A glance at the altimeter showed 1,100 feet. The breakthrough was due at any minute. The GCA operator notified us that we had passed over the range station. Rate of descent, 400 fpm.

In a matter of seconds the Cessna 170 broke out under the overcast and there about 4,000 feet in front of us was runway 13 right. "Okay," Jack commented, "flip off Little Joe and give him a rest. You make the landing." I disengaged the L-2 autopilot, lowered the flaps and reduced power. The Cessna touched down on the runway at Chicago-Midway.

In summing up my experience with the L-2 or Little Joe as my friend Jack affectionately called the autopilot, I flew the Cessna 1,000 miles and spent only a matter of minutes on the controls. The L-2 had taken me through foul weather with the same reliability as through good weather. All this service with a weight cost of only 36.7 pounds. END

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**2**

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## Give Your Gas a Break

*(Continued from page 36)*

the following information, then, serve other pilots, particularly those whose planes might stand unused for several months or more.

Gasolines with the general octane ratings required in aircraft are highly susceptible to the formation of gums. This has recently become very much of a problem as newer "improved" petroleum cracking processes have been introduced. These gums, when present in quantities of less than four milligrams per hundred cubic centimeters of fuel, are relatively harmless. Reputable companies endeavor to keep below this amount of gum content in all gasoline pumped into airplanes. As an aid in this problem, inhibitors are added in the refining process. They retard the formation of gum. However, even the best inhibitors now available have definite limitations and are effective for only a few months. After that, gums build up rapidly and the fuel becomes impractical for use in high-compression engines.

Ninety days is considered by the Military, for instance, the outside span of time during which 80 octane gas may be effectively stored. By the end of that time, gum concentration may possibly have risen to seven mg. per 100 cc.—the maximum amount that can be tolerated in automotive equipment. Airplane engines naturally are even more vulnerable.

Probably I had not used gas out of my left tank for four months or more, by which time the gum content had probably reached something like 10 to 12 milligrams. Result—a bad scare and a repair bill. END

## International Geophysical Year

*(Continued from page 24)*

rocket program is to obtain basic data on the upper atmosphere. Existing knowledge on the cause of the aurora borealis and on the fluctuations of the earth's magnetic field, is incomplete. Even the ionosphere, under scientific attack for many years, poses many unanswered questions. Basic subjects of study to be undertaken by the sounding rockets include: atmospheric structure, atmospheric composition, radiation studies, particle studies, ionospheric studies.

Dr. Joseph Kaplan, chairman of the USNC-IGY, says of the rocket program: "Rockets make possible direct measurements of quantities which are not observable from the ground. They can also be used for measuring the altitude dependence of geophysical parameters. But they spend only a short time at any one altitude during their flight, and their total flight time in itself is extremely short. This is unfortunate since fluctuations in such solar effects as ultraviolet and x-ray radiations, cosmic ray intensities, current rings encircling the earth, and particle streams impinging upon the high atmosphere, are among the most important and interesting problems connected with the physics of the upper atmosphere.

*(Continued on page 56)*

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*(Continued from page 54)*

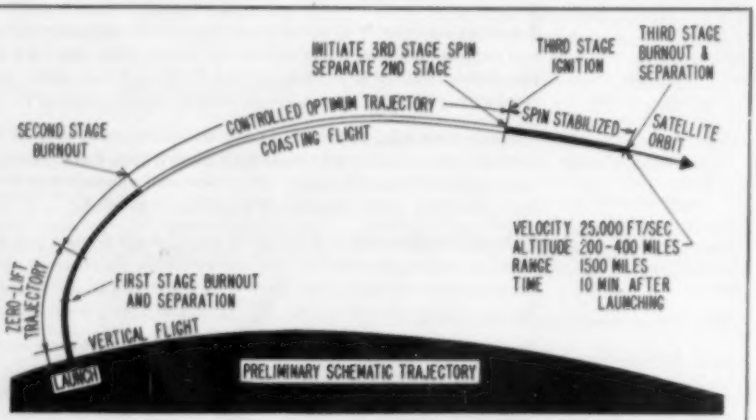
Earth-circling satellites, however, eliminate the shortcomings of high-altitude rockets. Due to their extended time of several weeks in space, they permit long term observations. The satellite is, in effect, a research station with electronic senses to report by radio on the conditions it encounters in space. Of all IGY activity nothing has so fired the imagination of people as the announcement made on July 29, 1955, that the United States would hurl into space at least ten artificial satellites.

The proposal to develop an earth satellite for scientific purposes, as distinct from strictly military ventures, which were well under way prior to the IGY satellite program, has been gathering momentum for more than a decade, when basic techniques for firing a small satellite were at hand. The interest of the American Committee of IGY in satellite vehicles began during the summer of 1954. A resolution was adopted on October 4, 1954, by the Special Committee for the IGY of the International Council of Scientific Unions:

"In view of the great importance of observations during extended periods of time of extraterrestrial radiations and geophysical phenomena in the upper atmosphere; and in view of the advanced state of present rocket techniques; CSAGI recommends that thought be given to the launching of small satellite vehicles, to their scientific instrumentation, and to the new problems associated with satellite experiments, such as power supply, telemetering, and orientation of the vehicle."

Prior to this meeting, similar resolutions had been adopted by the International Scientific Radio Union and the International Union of Geodesy and Geophysics. An extensive technical report on "The Utility of an Artificial Unmanned Earth Satellite" was prepared by the American Rocket Society Space Flight Committee and submitted to the National Science Foundation.

The White House decision to undertake the satellite program for the IGY was a direct response to the resolution of the Special Committee for the IGY, and the

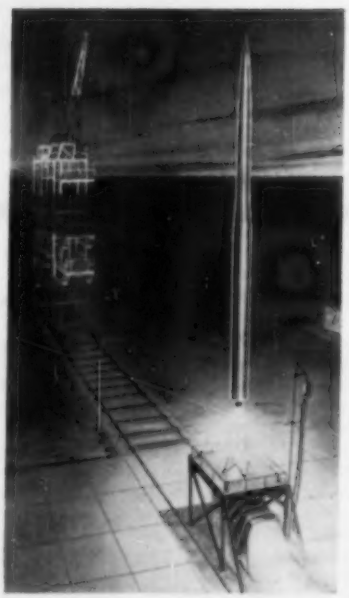



## SATELLITE LAUNCHING

AS PART of the U. S. participation in the International Geophysical Year, the world's first man-made satellite will be placed in its orbital altitude of some 300 miles above the earth by the Navy Martin Project Vanguard research vehicle, a three-stage rocket.

Shown at the right is an artist's conception of the launching, the vehicle resembles a giant rifle shell complete with bullet. It will be the first liquid fuel rocket designed to be controlled without the use of fins. The drawing below depicts the flight path from the launching at the AF Missile Test Center, Cocoa, Fla.

The first stage rocket is about 45 feet long; the second stage, mounted above the first, has a cone shaped nose section and also uses liquid propellants. The third stage, with the satellite attached to its nose, will be carried completely enclosed within the second stage rocket. Solid propellant is used in the third stage because of its simplicity.



United States National Committee was authorized to inform other countries of this decision.

On January 13, the Navy and the Air Force announced that they would hurl the first of at least ten satellites for the IGY program from the launching site of the Air Force Missile Test Center, at Cape Canaveral, Fla. The final satellite will be a sphere of approximately 20 inches, weighing 21½ pounds, and it will move in its elliptical orbit with a velocity of 18,000 miles an hour. The orbit will swing as close as 200 miles to the earth, and extend into space as far as 800 miles beyond the planet.

All the tracking sites already established along the Missile Test Range (representing a quarter of a billion dollars worth of real estate, structures, equipment, and instruments) running for 1,600 miles to St. Lucia, and soon to be extended for a distance of 3,000 miles, will be available for tracking the birds as they swing around the globe. In addition, more than 5,000 scientists of the 44 IGY nations will man some 2,000 stations around the world.

The satellites will be developed and launched under the code name of Project Vanguard, of which the United States Navy is the executive agency. Responsibility for producing the rockets has been assigned to the Glenn L. Martin Company. The first stage will be a modified Viking 12 rocket, using a 27,000 lb. thrust liquid-fuel motor. The second stage will be a modified *Aerobee-Hi*, and the third stage will be a solid-propellant rocket.

Plans of the satellite flight call for, "A vertical ascent for roughly the first mile after launching, then a gradual inclination toward the horizontal. The first-stage rocket will burn out and drop off at 30 to 40 miles altitude when a velocity of 3,000 to 4,000 mph is reached. The second rocket will burn out at about 130 miles altitude and about 11,000 mph, and coast under its own guidance into the satellite trajectory. At about 300 miles altitude the third motor will fire and accelerate the satellite vehicle into its orbital velocity, about 18,000 mph."

Basic experiments to be conducted with the instrumented satellites, as announced by the USNC-IGY, are:

1. Determination of outer atmosphere densities by observation of the air drag effect upon the satellite's orbit.

2. Obtaining of more accurate measures of the earth's equatorial radius and oblateness, of intercontinental distances, and of other geodetic data than are presently available.

3. Long term observations of solar ultraviolet radiation.

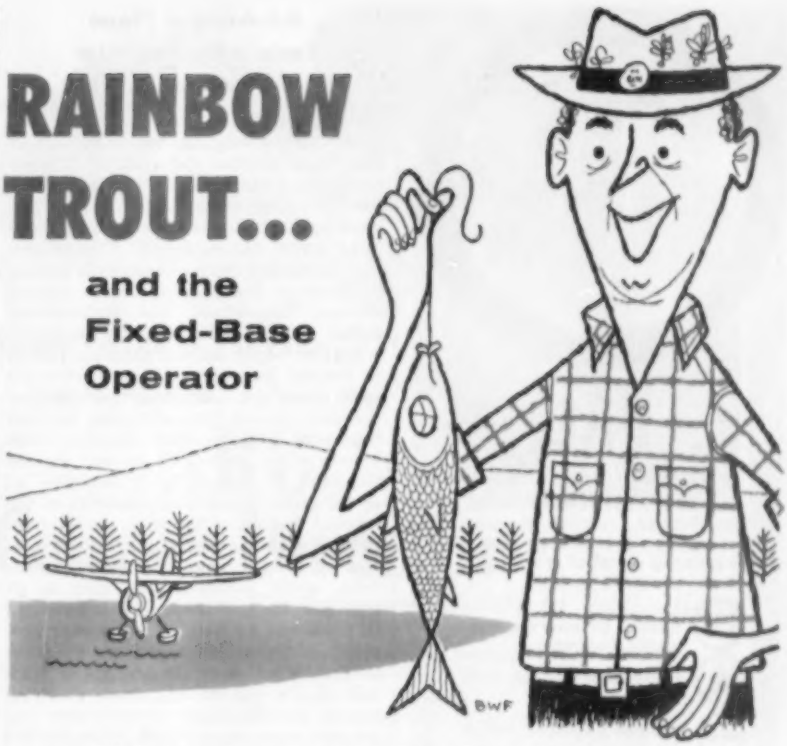
4. Studies of intensities and fluctuations in intensity of the cosmic and other particle radiation impinging upon the atmosphere.

5. Determination of the density of hydrogen atoms and ions in interplanetary space.

6. Observations of the Störmer current ring.

7. If possible, determination of the distribution of mass in the earth's crust along the orbital track. END

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## An Antique Plane Tests a Modern Pilot

*(Continued from page 27)*

movement of the column worked the elevators on the original, but movement of the wheel worked the rudder. Aileron control in those days was by "Body English"; the pilot leaning into the turn and working the ailerons through a yoke fitted across his shoulders. This feature was eliminated from the Bullock replica in favor of present-day aileron control through the wheel, and conventional pedals were added for rudder control.

Bullock began the test program just as in the old days—first by partial-throttle runs down the field to get the feel of the controls, and then advancing to short hops with straight-ahead landings. Soon he was able to take it all the way around the field. He found that it displayed all of the aerodynamic characteristics of the original, thanks to the thin, deeply-cambered airfoil that had been scaled from the photo, the between-the-wings ailerons, which increased the span to 31 feet, and the tail surfaces that operated in the direct air blast of the pusher propeller. Acceleration and climb were improved over that of the original as a result of the lighter and more powerful engine, but the flying characteristics and the feel were strictly 1912. Once he had gotten the hang of it, Bullock took the pusher on short cross-country flights and into small fields. In fact, he based it on his farm at Lakeville, Minn., and most of his flying was done from this dirt strip.

Most people today think only of the structural angle when they marvel at the courage displayed by the aviation pioneers who went aloft in flimsy contrivances of bamboo and wire. Few of them, even pilots, give much thought to the aerodynamic characteristics that the machines displayed. The handful of present-day pilots who have had the opportunity of flying any of the four Curtiss replicas now operating marvel at the skill of pilots who were able to teach themselves to fly on machines so completely devoid of any of the control characteristics and "feel" considered so important today. A flight in an airplane of this type is considerably more than just an interesting adventure; it is a sudden and stunning educational experience and a profound lesson in aircraft evolution. I know whereof I speak, and am deeply indebted to Mr. E. D. "Hud" Weeks of Des Moines, Iowa, for the opportunity that he gave me to fly the *Birdcage* after he bought it from Walt Bullock.

Quite a campaign preceded my first flight in the *Birdcage*, which was no casual "Would you like to take it around once?" affair. When I heard from Hud that he had bought it, I arranged for him to take some pictures of it and send me the negatives for my files. Some time later, I had occasion to travel by airliner from my home in Seattle to New York, so contacted Hud on the possibility of stopping over to fly the pusher. He didn't come out with a flat "Yes" or No," but went into detail about the handling characteristics, or rather, the lack of them. This didn't discourage me, since he hadn't said "No," so I replied with lengthy letters covering my qualifications to handle the ship, based on previous experience with other ancient and unconventional aircraft—gliders with no visible reference points out front, ships with no elevator feel, ships with no shock absorbers, and in such operations as flight without instruments. Apparently this convinced Hud that my enthusiasm was backed by sufficient know-how to justify trusting his little gem to my care, so he okayed the flight session, subject, however, to prevailing weather.

Little could be done in the matter of picking the time of year to suit the weather. The hop had to be made in Mid-January or not at all. On the day I arrived, the Des Moines weather was nice and sunny, but we couldn't fly—the wind was over 20 mph and not even the experienced pilots had taken the ship up

**RABBIT RUN**

Metropolitan Oakland International Airport in California shares its facilities with thousands of rabbits. Despite the heavy aircraft traffic at the field, no known fatalities among the rabbit population due to contact with aircraft have been reported, the long-eared inhabitants being partial to the grass areas between the runway strips.

under such conditions. I would have to make the flight the next morning before my airliner left. However, the afternoon was not lost, as I was allowed to familiarize myself with the pusher by making some taxi runs in it.

There was no wind at dawn the next day, but the sky was overcast and the temperature hovered at 20° F.; hardly a day for pleasure flying of any kind, much less in a ship without even a windshield. Hud, his co-owner Howard Gregory, and I opened the hangar doors and pulled the ship out. We made arrangements with the tower to taxi directly to our desired base of operations alongside one of the runways, and obtained permission to drive a couple of cars out and park them there. George Shane, a photographer, was in the party, and I gave my two cameras to Hud and Howard. Between the three of them, someone was going to get a good picture of me up in the air with that ship, so help me!

Since I was already checked out on the mechanical details, Hud and Howard only gave me a last briefing on the flight characteristics, and I kept these in mind as I taxied 3,000 feet on the grass to the other end of the runway, assuring myself that if I erred at all, it was going to be on the side of caution. This first hop was to be just a short one, straight ahead for the length of the runway. I got the green light from the tower, went through the onto-the-runway-and-turn-it-around procedure, and opened the throttle for my first take-off in an airplane that was only nine years removed from the date of the first powered flight.

The lightweight ship accelerated rapidly, and remembering the oft-repeated words of caution about overcontrolling the elevators, I began to ea-a-a-ase back on the stick. I couldn't have moved it more than a half inch before I found myself 20 feet in the air. The natural reaction was to get the stick forward in order to level out, but before I could consciously begin the movement I found myself pointed toward the ground and only managed to level out a few inches above the runway. From this point on, I pressed my elbows tightly against my sides to prevent any but the slightest of stick movements. This licked the overcontrol problem, and I was able to concentrate on other things.

After this first surge, I climbed back to 20 feet and then let down for a touch-and-go landing. This was followed by a long seaplane-type fly-on that used up the last thousand feet of runway, taking me past the photographers a few feet off the ground and completing phase 1 of the flight check. The turn-around procedure was reversed at the other end of the runway, and I taxied back to the waiting group with a very red face, expecting a stiff lecture as a result of the galloping take-off. Instead, I was pleased to hear that the zoom was, if anything, less than the average for a first flight in the pusher. Even 5,000-hour pilots, I was told, did the same thing no matter how thorough the briefing, which at best could only be an understatement of the facts. I readily agreed that no words

(Continued on page 62)

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AIRCRAFT OWNERS AND PILOTS ASSOCIATION

# AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is "To make flying more useful, less expensive, safer and more fun."

Headquarters address is Box 5960 Washington 14, D.C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

## GIFTS AID SAFETY PROGRAM

A gift of $5,000 has been made to the AOPA Foundation, Inc., for use in its aviation safety program, by Mrs. Margaret T. Day in memory of her late husband, Charles P. Day (AOPA 2290), who was fatally injured when his airplane crashed in Canada in June, 1955.

Mr. Day was a charter member of the Aircraft Owners and Pilots Association and took a keen interest in its activities.

The memorial grant will allow an increase in the number of copies to be made of the new AOPA Foundation safety film now in production. The AOPA 180° Rating, sufficient to permit its showing to practically all pilots in this country who wish to see it, according to J. B. Hartranft, Jr., president of both the Foundation and AOPA. The film will be dedicated to the memory of Mr. Day.

The increased number of copies is expected to make it possible to distribute the film to all groups of pilots, flight training schools, and educational institutions desiring to use it in their training programs.

The film is being produced by Film Originals, Inc., for the AOPA Foundation. It will depict graphically the safety measures taught in the AOPA 180° Rating curriculum, which was developed by the Institute of Aviation of the University of Illinois under a grant from the AOPA Foundation. The 180° Rating course teaches the non-instrument pilot how to turn back to safety when he runs into instrument weather for the first time.

Another contribution was received by the AOPA Foundation for its safety work.

Pilots at the Skylark Airpark, at Warehouse Point, Conn., started a fund in the memory of Albert A. Erickson (AOPA 39052), a flight instructor and owner of the airport, and Robert Craig Hanson (AOPA 127620) who were fatally injured in the same plane crash at Warehouse Point on January 25.

The fund was started at the suggestion of Mrs. Erickson, widow of the AOPA member. Aware of her husband's deep interest in AOPA and the AOPA Foundation, she requested that friends of the deceased pilots make contributions to the AOPA Foundation in memory of the two men rather than send floral tributes. A check for $32, mailed to the AOPA Foundation by Mrs. David E. Rosser, East Windsor Hill, Conn., on behalf of the pilots, was the result.

## AOPA OFFERS NEW TRIP SERVICE

AOPA is expanding the services of its Flight Department to include "packaged" trips for its members who wish to fly their own airplanes to the Caribbean, Mexico, and Canada. The new service is designed to fill a need evident from the repeated requests from members for an AOPA travel service.

Previously, AOPA's flight assistance has been limited to getting the member to his destination by suggesting routes, supplying navigational aids information and charts, getting foreign flight clearances, and handling other details incidental to foreign and domestic flights. The added service is expected to help the member and his party enjoy their trip after reaching their destination. Hotel reservations will be made, sightseeing tours arranged, and special recreational facilities provided. The new plan will, in effect, give members making the "packaged" trips complete travel agency service. This service will be given without charge to AOPA members.

Trips now being offered by AOPA are as follows:

1. 10 days in Mexico City and Acapulco, Mexico.

2. 11 days in New England and Canada.

3. Seven days in Miami and Havana.

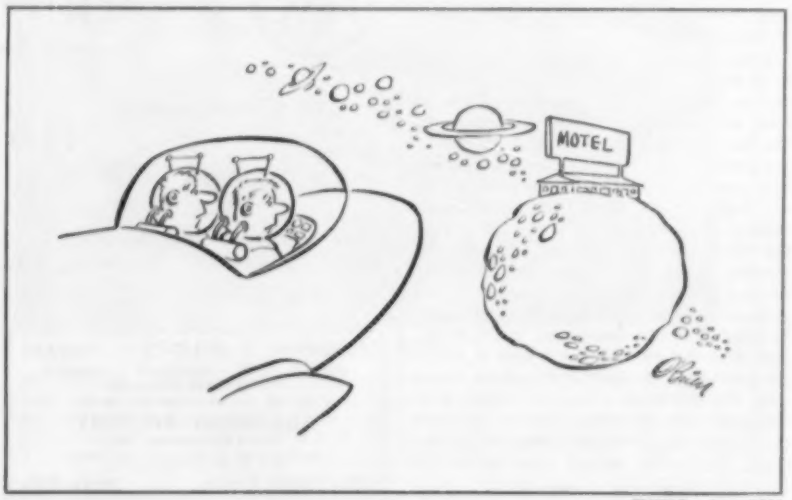
On the trip to Mexico the first five days will be spent in Mexico City with side trips to the nearby Pyramids of the Sun and Moon, the Temple of Quetzalcoatl, Palace of Cortez at Cuernavaca, Taxco, where beautiful handmade silver jewelry is made; Hacienda Vista Hermosa, and Xochimilco, which is noted for its floating gardens. Sightseeing trips will be made to places of interest in Mexico City and nearby area, including the National Palace, Chapultepec Castle and the Palace of Fine Arts. Using his own airplane, the AOPA member will fly to Acapulco, where a day of fishing awaits him and his party in a chartered fishing boat.

The trip includes five nights in a Mexico City hotel, one night at a Taxco hotel, three nights at Acapulco, meals in Acapulco and Taxco, sightseeing by private automobile and the chartered fishing boat at Acapulco.

The New England-Canada trip calls for five days at Martha's Vineyard and six days in Canada, with visits to Montreal and Quebec City and steamer cruises on the St. Lawrence and Saguenay rivers.

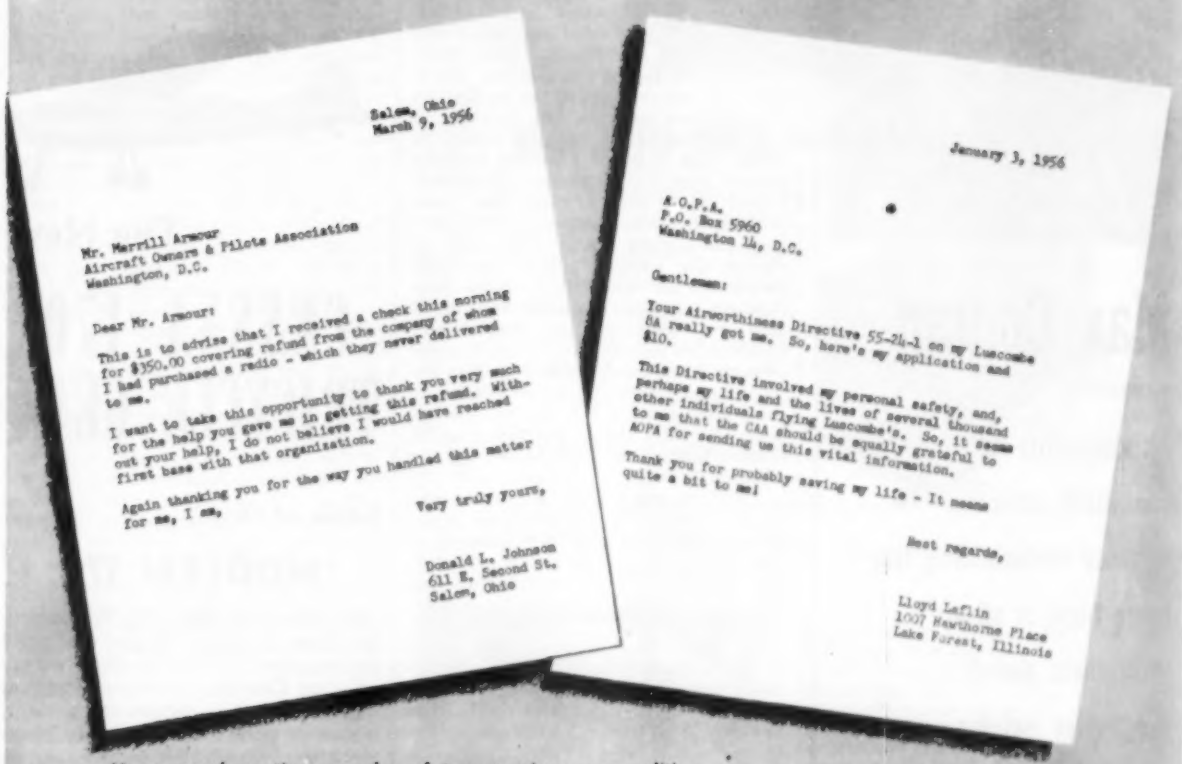
Sightseeing tours in both Miami and Havana have been arranged for AOPA members taking the seven-day Miami-Havana trip. In Havana, both the old and new areas of the city will be visited. Guides will escort the AOPA member and his party through the dungeons, and along the battlements of Morro Castle. On the sixth day of the trip the member, and others making the "packaged" trip with him will be guests at two of Havana's better known night clubs.

The trips to Mexico and Cuba are offered in both the winter and summer seasons. Rates for the summer season are lower, making it an ideal time for an economical trip abroad. The trip to Canada is offered from June 1 to September 8 only. It is possible to lengthen the stay at any point on the itineraries of the three trips if the travelers desire.



# AOPA services save

## *lives and money*



Salem, Ohio
March 9, 1956

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Aircraft Owners & Pilots Association
Washington, D.C.

Dear Mr. Armour:

This is to advise that I received a check this morning for $350.00 covering refund from the company of whom I had purchased a radio - which they never delivered to me.

I want to take this opportunity to thank you very much for the help you gave me in getting this refund. Without your help, I do not believe I would have reached first base with that organization.

Again thanking you for the way you handled this matter for me, I am,

Very truly yours,

Donald L. Johnson
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January 3, 1956

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Thank you for probably saving my life - It means quite a bit to me!

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*(Continued from page 59)*

could do justice to that elevator characteristic, and that it had to be experienced to be fully appreciated. I had been given a good idea of *what* to expect, but no idea of just how much.

Following this briefing, I went back and did it over, this time with the takeoff completely under control and the landing a much more precise and deliberate affair. Howard then took the ship clear around the pattern, and Hud followed suit. On my third hop, which was also a full-pattern circuit, I was really able to begin feeling the ship out. There had been no occasion to use rudder on the first two attempts, but this time it came into use with surprising results, or rather, lack of them. I wanted to make another pass for the photographers, so I stayed low at first. I found that I was drifting too close to the edge of the runway, and applied a bit of left rudder to change the heading. Well, the nose swung left all right, but the plane kept right on following the same flight path! This was something else new—I was crabbing ten degrees in level flight under no-wind conditions! I didn't wait to see whether or not the ship would eventually bring itself around, but dropped the left wing a bit with aileron and flew into the correct heading in time to set up the picture.

Climb-out was normal beyond the end of the runway, but the first turn in the pattern was undertaken very gingerly in view of the recent experience with rudder control. When I straightened out from this, I again found that I was holding a bit of rudder without affecting the flight path. This discovery was made during a quick look-around for orientation purposes. With absolutely nothing structural between me and the horizon to use as a reference, I had been watching the inside wingtip during the turn, and when I completed this, I looked backward to see if my course was at right angles to the runway. It was then that I noticed that the rudder was not centered. Even if the rudder had any feel to it, I would hardly have been able to notice it through my half-frozen feet. The answer to the rudder-centering problem on a ship that has no rudder feel and doesn't seem to care whether the rudder is straight or not is quite simple after you think about it—just look at your feet on the pedals to see that they are even with one another. This rudder business was one that the boys had not briefed me on.

The turn to the downwind leg, which was made at 300 feet at tower request, could really be called a turn this time, and was completed with considerably less than the quarter of a mile radius used for the first one. This was neither the time nor the place to check stall characteristics, but I did try a few cautious rolls on points, and found them te be completely satisfactory, although without feel. I found that the instruments were almost impossible to read since my overcoat bulged over the panel and I didn't have a spare hand to hold it to one side. I did manage to catch an airspeed reading of just under 40 mph, how-


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(Continued from page 62)

ever, which checked with what I had been told to expect, I didn't worry about the tachometer reading—the combination of throttle position and engine sound told me that everything was normal in the powerplane department.

Halfway along the downwind leg, I finally got that feeling of having reached the point where I had caught up with the ship and was flying it instead of it flying me. That anxious sensation that keeps you asking yourself "What the heck are you doing up here?" vanished and was replaced by an exultant feeling that made me want to shout "Look at me, I'm flying a 1912 pusher!" Maybe I did shout, I don't know, but from that point on, all anxiety vanished and the flight became real fun. Actually, mastery of the ship had come after a very short time compared to the required checkout times in some of the easy-to-fly modern ships. One thing that can be said for a ship of this type if nothing else: one either learns quickly or not at all.

The turns onto base and final were snappy affairs, and the landing went off as though it were a habit of long standing. My grin was as wide as circumstances would permit when I taxied back because I was practically frozen stiff!

If the *Birdcage* can be accused of having any dangerous vice, it would be the extremely over-sensitive elevator control. Previous pilots seemed to accept it as part of 1912-type flying, but I decided this should not be, and investigated the control system hookup. I sketched out some suggested changes in control-to-horn ratios, which Hud and Howard subsequently adopted. According to latest reports, elevator control is now quite gentle.

Other than having to watch elevator control like a hawk, putting around in the pusher was flying the way I like it—just the pure fun of it. Of course, the pusher is an extreme example, but aviation lost something when practicality and comfort abolished the open cockpit, and that intangible something is retained in its pure form only by the handful of enthusiasts who own and maintain open cockpit ships and by those who recapture the spirit of the old days by building authentic replicas of the real old-timers.

Of course, some of the purists among antique fans, who tend to regard them from the display rather than the operating aspect, deride the changes that have been made in restorations such as this—modern powerplant, steel tube construction, and control system changes. While they have a point, I cannot agree that it is a strong one. For my money, anything being built to fly should be made as safe as possible, and I, for one, am sure that no pilot will consider a slight loss of authenticity too great a price to pay for the peace of mind that results from unquestioned structural integrity and a reliable powerplant.

As far as I am concerned, Bullock's *Birdcage* adequately retains the essential aerodynamic characteristics of the 1912 original. The single-surface airfoil, with

(Continued on page 64)


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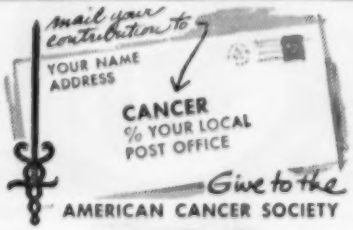

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*(Continued from page 63)*

a center of pressure that wanders around like a lost dog, and the absence of vertical fin and fuselage side area, are almost sufficient by themselves to teach the modern pilot some of the things the old-timers had to put up with. While there are detail differences in structure, the overall configuration of the machine is certainly accurate enough to be thoroughly representative of the period. If nothing else, that out-front seat taught me one thing right at the start—the boots-breeches-and-leather-jacket costume adopted by the old-timers was not an exhibitionistic affection—it was a dire necessity. When my legs were pointed right into that freezing headwind, I fervently wished that I was dressed like a 1912 airman. END

## Soaring Championships Come Hard

*(Continued from page 41)*

July 9th—5th Day: A task day. Conditions weak. The task—a 76-mile speed run to the Eaton Airport at Norwich, N. Y. One pilot, Clarence See, flying a big two-seater, boiled out from the top of a cumulus at 14,000 feet and his straight glide from there beat all the others. *Alibi*, encountering spotty lift, set no records for speed. "When the airport finally showed," said Trager, "it looked like Harris Hill before the first take-off."

This day's flying left the leaders still tightly packed—so much so that the Contest Board was getting on edge. *Alibi* had not yet made her move; she still loped along in 8th position.

July 10th—6th Day: Sunday, an open day. Conditions so weak that most pilots couldn't get go-away altitude and returned to the Hill. Trager tried twice, morning and afternoon. The afternoon flight—from 3:30 to 7:15 scored him only 50 points. *Alibi* still held that 8th spot. Only three days left in which to move up.

July 11th—7th Day: A task day. The Contest Board had really cooked up something to shake the top ten apart. They set four goals of 33, 132, 176, and 215 miles. Someone would surely goof with all these marks to shoot at.

This was *Alibi's* day. Her pilot selected the 176-mile goal, Hagerstown, Md., while most of the other veterans looked at the sky and elected to shoot the works. These over-bold pilots collected no bonus points on this day. That evening the score was tighter than ever. It read: 1st, Goodhart, 894; 2nd, Ivans, 849; 3rd, B. Smith, 775; 4th, Schweizer, 764; 5th, Trager, 756; 6th, See, 752; 7th, Bennis, 748; 8th, S. Smith, 696.

July 12th—8th Day: An open day. The winds were reported fickle, so much so that a pilot might choose any goal lying 100 to 270 degrees from Harris Hill. This next to the last day was one to try the souls of sailplane pilots. A fortunate selection of goal could sew up the race; an unhappy choice would settle a pilot's hash for good.

Trager again named that 176-mile goal that had been so kind to him yesterday

and paddled down the cloud street toward Hagerstown. Wonderful going! Arrived over the Maryland field, he could not bear to land and elected to head down into West Virginia in an all-out gamble for distance. Finally, at 7:15 a.m. *Alibi* came to rest at Martinsburg. The scoring, with but one day's flying left, put Trager at the top of the American entries. Goodhart still led but, not being a citizen of the U. S., he was not competing for national honors.

July 13th—9th and Last Day: The Contest Board, for this last day, set a goal and return assignment that was all but impossible of attainment. The airport at Utica, N. Y., 104 miles away, would be the turning point.

To win national honors *Alibi* had to hold her own. She need not do better than that, but she could not afford to do much worse. Lift was very poor this day. Again the early starters had the best of it. Trager was working the warm air rising from a grass fire. He was spiraling to the right, keeping an eye on two other sailplanes corkscrewing to the left. "We'll all have to set down at Utica," thought *Alibi's* master.

But in that moment along came two ships that had made their turn at Utica and were hightailing for home, piling up points. Trager then knew he was up against it. The championship hung in the balance. The hundreds of hours that had gone into *Alibi's* construction would now have to pay off.

As she made her turn—the last one to come around—the V-tailed sailplane from Detroit was down to pattern height. It looked like the fade-out, but somehow she ran into zero sink and then caught a distinct up-draft. A little later the last rays of the sun kissing a wheat field lifted *Alibi* and Trager to a glorious 4,000 feet. After that there was some more zero sink and then the glide for the final landing, and victory in one of the most closely fought contests in sailplane history.—END

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## Cradle of Design

*(Continued from page 29)*

things done, and makes transition from school to factory a mere change in location!

Perhaps, however, the most important aspect of Northrop training is its emphasis on thinking in terms of the production process. Before you have talked with anyone here more than five minutes, you'll find him stressing "designing for producibility".

"Design" has a variety of meanings. To the artist, it is creating eye appeal, with color or form. To some engineering researchers or consultants, it is determining the overall scientific concepts of a system or structure, with many "details" left to be filled in. Actually, nothing has been completely "designed" until it is in shape to turn over to the shop which must produce it, delineated in terms the shop readily can assimilate, and in a form that can be produced with reasonable economy and speed.

The heart of aeronautical engineering is designing component parts—not plane contours. For every aerodynamacist, stress analyst or research engineer, the industry needs dozens of component parts designers. Here, on the engineering department's drawing boards, is the great proving ground where all but a very few young engineers break in. So here at the start our graduate's knowledge of shop practice, as well as engineering theory, pays off. He understands foundry practices, for example. So, in castings, he avoids too thin walls, too complicated patterns and designs likely to result in high rates of rejection. He is familiar with the particular characteristics and special advantages of scores of materials used by the industry. He knows that materials used and fabricating methods employed may change with the quantity needed; a part might be made from laminated riveted sheet stock in one instance, machined from solid bar in another and forged with

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special dies in a third. And he knows the circumstances under which each is preferable. Those, and a host of other basic shop considerations have been drilled into him.

Many of our graduates have gained practical extracurricular experience while in school, for at Northrop part-time work by students is the rule. The worthy student who needs financial assistance in completing his education can find many ways to help himself. Due to the school's location in the heart of California's gigantic aviation industry, students easily find part-time employment in the industry itself. Seventy-six per cent of 1955's senior classes, for example, secured both experience and income in this way. In many cases, working wives help husbands keep the family budget balanced during school years.

In addition to men just out of high school or the armed forces, there are many who, aspiring to be "more than mechanics," have quit laboring jobs to train in the aeronautical engineering field. These of course are anxious to return to full-time employment as soon as possible, consistent with sound schooling. Our two year compacted course is ideal for them.

When you first visit Northrop Aeronautical Institute your impression is industrial rather than academic. The school is located in the complex area that surrounds Los Angeles' great International Airport, with such major plants as Douglas, Hughes, North American and Northrop nearby. Lockheed and other giants are but a short bus ride away. This strategic location has greatly simplified our Placement Department in helping students secure the type of part-time employment they desire.

From the street, the school easily could be mistaken for an industrial plant with an attractive, modern administration building in front, then many-windowed engineering buildings, a hangar and shops to the rear. For, though the product is higher education rather than manufactured articles, a plant is exactly what it is.

In the administration building, you find the offices of Director McKinley, and other school executives, plus quarters for counselors who help students with housing, part-time and employment, and other personal problems. Here, too, are the rooms in which representatives of aviation firms from far and near interview students regarding permanent employment to follow graduation.

Step through the administration building, skirt the recreational area and enter one of the advanced drafting rooms. Here your impression of an aircraft plant engineering department is accentuated. In the spacious, evenly lighted rooms, men are working over drafting tables with the same instruments and equipment used in industry. But supervision is closer; instructors circulate constantly, pointing out errors, suggesting improvements. And on display are drawings ranging from the most elementary to complex ones comparable to those used in actual production.

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*(Continued on page 68)*




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*(Continued from page 67)*

pattern for a die to be used in forming a bubble canopy for a cockpit. Next we find an airplane model for wind tunnel testing is taking shape. Beyond we see work tables with various materials, including breakaway plaster molds, several types of plastics, glass cloth, sheet metal and model templates. On through the shop, we discover a hydropress, of the same type as used in aircraft construction.

In another shop area, we find the hydraulic section. Here are working mockups of the types of hydraulic systems usually found on aircraft. The way such systems operate brakes, wing flaps and landing gear is demonstrated by actually energizing the systems mounted on the mockup.

Over in the radio, electrical and instrument section are similar "working units" showing how such auxiliary systems are used in aircraft. Among them we discover automatic pilots, heaters, pressurization systems, anti-icing equipment and oxygen systems, set up to demonstrate operational use.

Beyond the instrument section, in the electrical shop, we find an aircraft generator being tested. A voltmeter and an ammeter record the output, determine whether or not it comes up to government

## NATIONAL FLYING CLUB CONVENTION

PILOTS interested in the national aspects of the flying club situation will have a chance for discussion, planning and four days of fun, trips and prizes this summer at the first National Convention for Flying Clubs ever held in the United States.

Sponsored by the Washington State Aviation Association and AOPA, the convention will be held July 30 to August 2, at the New Washington Hotel in Seattle, with registration starting July 28. Developments during the four days can mean much to the future of private flying and club flying in this country. Panel discussion topics include: operator-club relationships, the possibility of a national flying club organization, maintenance and engineering of light aircraft, use of radio and ADIZ problems.

Highlights of the convention will be a trip to the Boeing Aircraft plant to inspect the 707 jet *Stratoliner*, a steamer trip to Victoria, B. C., tours of the Battleship *Missouri* and an aircraft carrier. Two round-trip tickets to Hawaii by air and two round-trip tickets to Alaska by air head the eye-catching list of prizes to be awarded flying club members attending the convention. In the photograph above, Marleigh Udall of Seattle spots model planes on U. S. map for each city participating.

The National Flying Club Convention is an outgrowth of the National Safety Program for Flying Clubs initiated in 1952 under the sponsorship of the Central Valley Empire Association in California and sparked by personnel of the CAA Aviation Safety District Office in Fresno.

A registration fee of $15 for the Seattle convention covers the many tours and social activities which have been planned. Correspondence may be directed to Chairman, National Flying Club Convention, Box 6, South Annex, Boeing Field, Seattle 8, Wash.

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standards. Students are operating all equipment and making all computations under an instructor's careful supervision.

In the various propulsion sections, we find both jet and piston-type engines being assembled, disassembled and tested. There a crankshaft is being put into a magnaflux machine, to reveal any invisible flaws in the metal. We see cutaway models of jet engines, plus additional types—pulse jet, turbojet, ramjet, solid and liquid fuel rockets. In a detached test cell section, an engine is mounted on a test block. At the controls in an adjoining room, a student is noting its behavior at various speeds.

In the hangar, we find "Project 300" a lightplane taking shape, plus other planes of various types owned by the school. Students swarm over them, probing, checking, measuring, calculating, learning.

In the classroom, our courses deal with such subjects as College Algebra, Trigonometry, Descriptive and Analytic Geometry, Calculus and Applied Statistics. English Composition, Technical English and Report Writing receive due attention, for an engineer must be articulate. Design engineering as carried out on the drafting board is emphasized throughout the course. Some examples are principles of engineering drawing, electrical system design, power plant installation design, hydraulic system design, mechanism design and developmental design of the overall airplane. These are keyed to the increase in the student's technical knowledge, for to be of maximum value when he gets on the job he must be able to prepare clear, "producible" drawings.

Mechanics, Electricity and Magnetism, Heat, Sound and Light, Electronics, Hydraulics and similar subjects are covered in classroom, laboratory and shop.

In Stress Analysis, Servomechanisms, Aerodynamics, Thermodynamics and other courses, the shop and hangar likewise are used extensively to supplement the classroom. For an engineer, the learning process is continuous. He must keep on studying and learning thoughout his lifetime. School, of course, provides the basic training to solve today's engineering problems but as well gives the graduate a sound background to approach with confidence the problems of the future.

What type of future? "I expect the automatic guided missile eventually to take over the role of fighter, bomber and reconnaissance planes," says John K. Northrop. "Such missiles will be greatly superior to manned aircraft, and more economical.

"On the other hand," he continues, "I do not expect to be sealed within a rocket and shot automatically to New York or London within my lifetime. Transport aircraft for passengers and cargo will be with us for a long time to come. Just as control of aerodynamic forces at supersonic speeds, elimination of resonance and oscillation, and damping of catastropic flutter are current problems; so will the future rival these in variety and complexity. And I am fully confident of one thing: Prominent among those who solve the future's problems will be many of our graduates." END

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## Bugs Are Big Business

*(Continued from page 39)*

Pest control arrived when DDT was discovered.

Serious consideration of aerial insect-control leaves little doubt that there are two distinct phases—the period *before DDT* and the current one, which we will call *after DDT*. Before DDT was produced, the application of insecticides by plane was practical, and used extensively only in the cotton fields.

This limited use was not due to lack of recognition of its advantages. Quite the contrary—everywhere, the results obtained from crop dusting were acclaimed. Large acreages could be treated quickly and effectively with no mechanical damage to soil or plants. Forests and swamps were no longer inaccessible. There was, however, one great obstacle—the large quantities necessary for satisfactory control made the cost of aerial applications prohibitive to the average farmer, even though the poisons used were undiluted dry powders. Less concentrated liquid sprays required even greater quantities.

DDT changed all of that. During the search for better insecticides to combat malaria-carrying mosquitoes in Pacific and Mediterranean areas, entomologists found that, "DDT in an oil-solution spray gave good results when as little as one-fifth to one-fourth pound per acre was used." Engineers quickly developed efficient spraying devices for various types of military planes and shortly thereafter, entire islands were being sprayed as routine protective measures.

As the war concluded, the development of DDT was given widespread publicity and the rush to adapt aerial spraying equipment to meet civil needs was on. Farmers, lumbermen, cotton growers, timberland owners, health authorities, even the "man on the street," became air-minded with regard to insect control.

Fortunately, war surplus planes were available at low prices and there was an abundance of former military pilots eager to take peacetime jobs in aviation. That seemed sufficient at the time. The general public, in those DDT-conscious days, regarded the entire business of insect slaying through a rosy haze. Their attitude was that, now with the flyers back home and miraculous DDT so easy to get, the entire insect population was doomed.

Unfortunately, man's war with the insects was by no means over. No insecticide could accomplish that miracle. It would be utterly impossible to close the trillions and trillions of tiny mouths that play havoc with farm crops each year in so short a time with so limited an amount of destructive agents.

The crop duster, from the very beginning, has done a terrific job in agricultural work impossible of accomplishment before. Examples are myriad—a burned-out forest south of the Grand Canyon was seeded to prevent erosion. Since 1946, dusters have buzzed hundreds of thousands of acres of valuable woodlands in New England against the disastrous gypsy moth. The Department of Agriculture estimates a single C-47 plane load of insecticide on such a mission, "treats as large an area as could be covered by

one truck-borne spray rig in four years—and more effectively."

Suppressing emergency insect outbreaks is a crop duster's specialty. In 1948, the tussock moth successfully infested 450,000 acres of forest land in the northwest. A hurry-up call brought a pilot and a plane and within a few weeks' time, not one moth could be found. What's more, the area had been sprayed so effectively, no additional treatment was required. Each year since 1949, crop dusters have sprayed and baited several hundred thousand acres of Wyoming and Montana forage lands to control one of man's most ancient and destructive pests—the grasshopper.

Today, America's agricultural aviators are accomplishing even greater feats. They are hard-working, conscientious, and quick to utilize the ever-increasing number of weapons which scientists and researchers place in their hands.

I have heard crop dusters referred to as "harum-scarum" and, frankly, my blood reaches a sizzling point. Actually, nothing could be further from the truth. The crop duster pilot must of necessity be a level-headed, safety-minded business man—or he won't survive as a duster. John F. Neace, manager of Marsh Aviation in Phoenix, Ariz., employs 27 duster pilots. He remarks, "The average man sees a crop duster miss a tree by six feet and thinks this is an extremely dangerous business. Then that same man gets into his car and races down the highway at 60 mph missing by less than three feet another car travelling toward him at the same speed. I know by experience that these pilots of mine consider themselves just like the boys of yesterday who shovelled fertilizer off the back of a wagon. The only difference is that crop dusters do it faster and more efficiently."

Just as agricultural aviation did not mature overnight, so too its pilots require "seasoning." According to some authorities, pilots who acquired their skill in other branches of aviation do not always make good crop dusters. For example, the military pilot of today sometimes finds it difficult to convert to this specialized work. He may be an expert with jet fighters or multi-engined bombers and transports, yet find it more than a little difficult to handle light, but heavily-loaded, duster planes.

In addition to being a specialized pilot, the crop duster must have a working knowledge of the insecticides he uses. It is important that he does not distribute material which will damage adjacent crops, and that his powder and spray will not seriously affect beneficial insects, game and wildlife. Also, he must know the insect killer applicable to each specific case. In some instances, farmers have wanted their fields sprayed or dusted with a compound recommended by a friend or relative. Had the crop duster not known better, the farmer would have suffered heavy loss. It is the agricultural aviator's duty to explain such matters and to make proper recommendations.

In agricultural aviation, unlike many other industries, certain factors cannot be

*(Continued on page 73)*


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Ground activities include weekly rodeos, horseback riding, hunting, square dancing, and swimming in the Flying L's pool which is supplied with filtered artesian well water.

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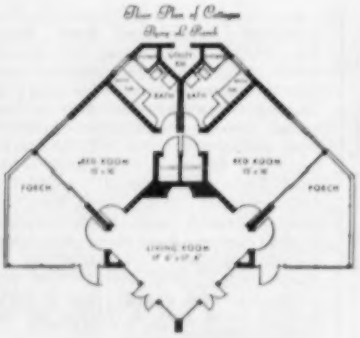

(Continued from page 71)

controlled by man. Air-movement (wind and convection), temperature and humidity are unpredictable forces which often limit the effectiveness of aerial insect control. The most important of these is wind. Wind may cause irregular coverage or contribute to material drift away from the prescribed area. However, the amount of spray or dust lost due to drift does not depend on wind velocity alone. Altitude and the size of released particles also affects material loss. In a wind of one mile an hour, a 200-micron drop released ten feet above the ground will drift about six feet. But if the drop is released in a 10-mile-an-hour wind from an altitude of 50 feet it will be carried about 300 feet. Under the same conditions, a 20-micron drop will travel some 3.5 miles.

When the new, more potent sprays are used, wind effects on distribution are extremely important. It may cause material to drift away from the area for which intended and damage another's property. An example of such damage is that suffered by beekeepers. There are instances where drifting insecticides have killed colonies of bees where no aerial applications were known to have been made. The crop duster must be aware of all these factors and his activities must be confined within their limitations. Under no circumstances must he operate in winds of more than 10-15 mph when spraying for mosquitoes or farm pests. If a forest is the "target," wind velocity should not exceed eight mph. Local conditions may alter circumstances so that even these velocities would be too high.

Convection is upward flow of air that occurs when ground temperature is higher than air temperature. Convection currents are early-risers. They usually appear shortly after sunrise and increase as the sun warms the ground. By mid-afternoon, they may develop considerable force. They are variable, even more so than wind, but they carry drops and particles upward instead of horizontally.

The effects of temperature and humidity on aerial spraying are indirect yet important. Increased temperatures contribute to convection currents and tend to promote the rate of evaporation. Evaporation is of great importance when "finely-atomized" or highly volatile materials are used. Humidity is important only because of its effect on the evaporation of water spray. Crop dusters have reported finely-atomized water sprays, applied on hot, dry mornings, evaporated before it hit the ground.

Even after all of its shortcomings have been weighed—the difficulty of controlling air-applied insecticides, the damaging drifts into adjacent areas, sometimes the higher cost—agricultural aviation is one of the most valuable tools science has given modern man. Each year, with improved methods, expenses decrease and the number of hours flown increases.

In New York, Florida, the Central States, the Southwest and the Far West, agricultural aviation is a "must." In fact, the industry has mushroomed so fast that currently there is a shortage of agricultural aviators. END


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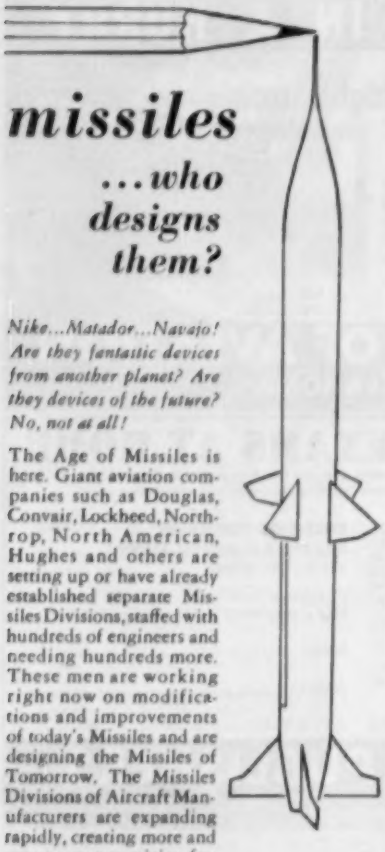

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## HANGAR FLYING

*(Continued from page 18)*

gnarled mesquite trees, but the field was plenty long for a *Cub*. No sweat there. I swung around and pointed the shiny yellow nose down the runway. As I pushed the throttle open the little ship leaped forward eagerly, its tail up, accelerating rapidly. I brought the nose up in a steep climb.

Halfway down the grassy strip, it happened. No warning. The engine quit. It sure was quiet.

I dumped the nose immediately, realizing I had very little airspeed. Ahead were the mesquite trees. To the right was an oat field toward which I turned until I saw the drainage ditch across it.

Then over my left shoulder I saw there was still a little runway left. Desperately I swung the *Cub* back, shoved high rudder, straightened out, brought the nose up high. Mushing now, we hit hard on the soft shoulder of the runway. The landing roll wasn't over 50 feet.

Feeling mighty silly over my little exhibition, I climbed out and looked around. The plane was unscratched. What was the trouble? I looked again at the gas gauge. It still showed about an inch of rod above the cap.

I pushed the rod to see if it was stuck. It didn't move. The float was on the bottom! Unscrewing the cap, I pulled the gauge out. Then I saw. The float-and-wire gauge was home-made. And an inch too long! I had taken for granted that it was a standard factory model.

The fuel had seen so low that the acceleration of the take-off plus my spectacular climb had starved the engine.

RAYMOND L. NICHOLAS

Irving, Tex.

### WHEN IS A PRE-FLIGHT?

I POURED the coal to the Cessna 120 and climbed out of Salt Lake Municipal Airport on my first solo cross-country flight.

When my wheels touched the runway at Delta, Utah, 1 hour and 26 minutes later, I was pleased to find I had come within four minutes of my estimated time of arrival. My precise planning of the night before was beginning to pay off.

The gas boy sauntered over and asked if I wanted gas. Although I had more than enough in the tanks for the return trip, I had him top them off. He was still checking the oil when I walked over to the building to file my flight plan.

When I returned to the plane and proceeded with my pre-flight inspection, the gas boy laughed. "I'll bet this is your first solo cross-country," he said. When I nodded my head, he informed me that a pre-flight inspection is made only once a day. This seemed reasonable, so I climbed into the cabin and taxied out to the runway.

I was coasting down from 11,000 feet to Salt Lake City and the return trip seemed uneventful when, suddenly and without warning, the hood began to shake. I pulled on the carburetor air heat. The tachometer pointer dropped slightly. It wasn't carburetor icing. For a moment, I looked out in disbelief. Now my hands were trying to keep up with my tense mind. Take off carburetor heat . . . try left magneto . . . now right . . . switch back to both . . . try left gas tank . . . check primer position . . . did I forget anything? Everything checked normal except for the hood which shuddered furiously.

Calling Salt Lake Tower, I received clearance for a straight-in approach, made a short landing and taxied off at the first taxi-way.

One of the crew signalled me over to the gas pit and walked up to the side of the Cessna as I climbed out. He shook his head and pointed to the hood latches. One latch was completely unfastened and the other was halfway off. Apparently, the gas boy at Delta had forgotten to secure them.

"Do you want to come down blind with the hood flapping in your face?" I listened as he gave me a well deserved lecture on pre-flight inspections.

TERUO FUJII

Salt Lake City, Utah.

### I Learned About Flying From That!

*(Continued from page 47)*

low I couldn't see out the windows. If only that mechanic had been with me!

Needless to say, I finally got down. First I asked the other pilot what he meant by leaving me when he knew I had no map. He had a date that evening and didn't want to be late!

The mechanic? He got that battery from a grounded wreck! It wasn't a spare at all. How was he to know it was dead? That was his excuse.

Another time I depended upon others for charts and ran into grief. This time it was two Aviation Cadets. I was to fly them in a twin Beech on a navigation and bombing training flight from Carlsbad, N. M., to Sanderson, Tex. They had their charts and route all planned, so away we went without further ado.

We arrived at the Initial Point plumb on the nose. Before turning onto the bombing run, one Cadet was to set up the automatic pilot to enable the bombardier to control the ship with the Norden Bombsight. He set up the aileron and rudder controls okay, but when he kicked in the elevator switch, the ship zoomed into a sudden climb. I slammed off the master switch and told him to set her up again. The same thing happened. I told him to watch me do it. Same thing!

It had a malfunction. All this time we had been flying on beyond our bombing point. Over the interphone I asked the bombardier if he knew our location.

"Yes, Sir," he said.

I asked him for a compass heading to our target. We turned to the heading he gave and flew on. We flew on and on.

I asked him again if he knew where we were.

"Yes, Sir," he assured me.

On we flew. Below us small mountains came up. I asked this bombardier how soon we would reach our target.

"I'm not sure, Sir," says he.

"Are we lost?"

"I don't know, Sir."

"Do you know where we are?"

"No, Sir."

"Then we're lost!" I assured him.

I ordered him to bring his charts to me so we could locate ourselves. He pointed out our last positive check point—in the overlapping zone.

"Give me the adjoining chart."

"I didn't bring it, Sir!"

I cranked the radio dial to pick up a range—any range. None came through. Maybe we were in Mexico? No, that wasn't possible. Even three lunkheads like us couldn't have missed the Rio Grande. However, we were a long way from nowhere. Our home base was west, so west we turned. Finally I spied a village in a deep valley. On the side of a hill I could see a couple of words spelled out with whitewashed rocks. We were too high to make them out so I began a spiraling descent. Finally I got close enough to read the words. They said, "Safety First!"

We continued west and I reduced power to extend our fuel. Eventually we cleared the mountains and I debated whether to make a wheels-up landing on the desert or continue until the fuel gave out. Just about then I picked up a radio signal and followed it to Hobbs, N. M. That was only 70 miles from home base, so rather than face an embarrassing explanation to the CO, I decided to squeeze our way home.

I haven't had any more experiences like this because I no longer take anyone's word for anything. I check myself. I don't depend on someone else for charts either. In fact, I won't even go up on a local hop without a chart in the ship. And I am old enough to dish out a little advice: Ask questions, but don't risk your neck on the answers. Then you'll live to learn about flying. END

### BUSINESS FLYING

ONE of the most valuable booklets published each year in aviation is the CAA's "The Airplane at Work for Business and Industry." The new edition (available from the U.S. Department of Commerce for $1.00) is a 1955 Survey, covering 1954 activity.

Of a total of 61,300 general aviation aircraft flown in 1954, 34,200 reported they did some business flying. Of these, 18,750 were used primarily in business, not for hire. Business concerns owned 9,750 of these business aircraft, individuals owned 8,610, and government units, exclusive of the CAA, owned 210.

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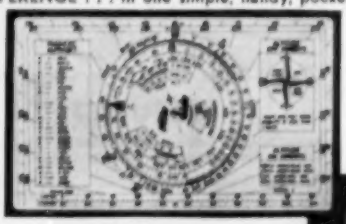

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## Magic Carpets Over Baghdad

*(Continued from page 25)*

The flight school is run much as the average American operation. Ground school in theory of flight, radio procedure, pilotage, meteorology, and aircraft and powerplant is an integral part of flight instruction—flight instructors serving both purposes. Most school airplanes are radio equipped, but whenever a battery happens to be "down," a telephone call to the tower for clearance is all that is necessary. School airplanes use sod runways paralleling the two crossed hard surface strips, one of which is 6,300 feet long and can accommodate jets. Flight standards are patterned after British civil requirements and are not overly different from ours. They execute rectangular patterns and 45° downwind entries also. Coordination exercises are perhaps insufficiently stressed. A marked amount of skidding on turns by average students may be a direct result of this. Power-off, 180° side aproaches are ignored in favor of shallow base-leg, long, final, power-on approaches. Practice areas are designated for students, but Iraqis, perhaps more so than State-side students, are forever getting into trouble with authorities by buzz jobs on camel caravans and herds of water buffaloes. Their raiding Bedouin instincts no doubt come to the fore in this sense.

Cross-country over the Mesopotamian area is a cinch for students, provided they don't wander far from either the Tigris or the Euphrates. Mosul, in the uplands to the north, and Basrah, Iraq's seaport at the southern terminus of the twin rivers, are favorite objectives, each with an excellent airport. Mosques and palm groves are good landmarks and the country is so flat that an emergency landing is not much of a problem. Radio facilities, as might be expected, are limited; but, even so, one could easily obtain a directional bearing on the Baghdad range station or any of the commercial stations, provided one knew some Arabic.

Air activity over this part of the Middle East is considerably heavier than one would at first believe. The British have operated two strategic airbases in Iraq for many years—one at Habbaniyah, a short distance from Baghdad, westerly along the route to Damascus. These bases recently have been turned over to the Iraqi Air Force, but effective liaison is maintained. It is not uncommon, therefore, to watch *Canberras* and *Vampires* whisk by on daily training missions. Baghdad is fast becoming an international crossroads for airlines making transition flights from Europe or the Near East to India, Australia, and the Far East.

No longer the inaccessible place it was in centuries gone, and even as recently as four decades ago, when the land was freed from the Ottoman Empire, Mesopotamia is reached by fairly comfortable land and sea routes. Whether it be by air-conditioned Nairn buses over the old camel-caravan trail from Damascus to Baghdad, by the Berlin Express from Istanbul southerly across the Turkish border through Mosul, or by freighter via

the Persian Gulf and Basrah, Iraq can be visited with great feasibility. Once in Baghdad, the visitor-pilot can have a magic carpet at his disposal.

A land which was the reputed site of the Garden of Eden, even though consisting of much wasteland, cannot fail to afford unique experiences to the adventurous pilot-traveller. History is so rich and multiple in the land of Abraham and Ur of the Chaldees, the land of Babylon and the Hanging Gardens—the "Cradle of Civilization." END

## MAILBOX

*(Continued from page 6)*

statement which could be fatal to the beginner in high altitude flight. Mr. Durosko says, "I've found that when my oxygen supply is insufficient my fingernails begin to turn blue." He is so right, but *never* wait for that to happen before increasing your oxygen supply or before dropping down to a safe altitude.

By the time the fingernails turn blue, not only may the person be unable to see and to understand the blue color, but he may no longer care. He may loose consciousness, or perhaps, in his mental confusion, climb to a higher altitude.

So before attempting a high altitude flight, take a few minutes out and learn the capabilities, limitations and dangers of using oxygen at high altitudes. Make sure your oxygen equipment is in good condition and that it carries enough oxygen to get you where you're going. If you are doubtful that the oxygen supply is adequate during flight, turn it up a little. Too much oxygen won't hurt you.

R. NEVIN RUPP
Student
School of Medicine
Univ. of Penn.

Philadelphia, Pa.

### 2:05 TO SOLO

I read with interest the letter in the March Mail Box called "Solos in One Day" relating to Miss Charline Pledger, a student who soloed in one day with 4 hours and 40 minutes instruction.

You might be interested in my husband's achievement in 1947. He had a familiarization flight when he joined the Oshawa Flying Club. The following week he began his course of instruction. After taking 2 hours and 5 minutes dual instruction, familiarization flight included, the instructor was confident he could handle a solo flight. He made a successful solo, then continued with the regular course toward his license.

MRS. DOUGLAS WATSON

Cameron, Ont.

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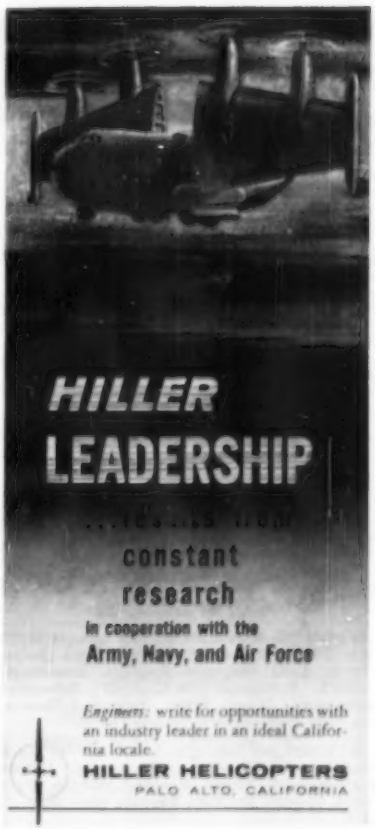




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# Briefings . . .

(Continued from page 12)

tionalities, ranks and job assignments from 15 nations, the club operates two high-wing monoplanes and a biplane donated by the French Air Ministry. Headquarters and hangar space were donated by Morane-Saulnier, French airplane manufacturers. Instruction is supplied by Wing Commander John D. Sidebottom and Flight/Lt. Murray Warson of the RAF and M/Sgt. Robert Alexander, USAF.

REVISED AND ENLARGED, the latest edition of "The Aircraft of the World" by William Green and Gerald Pollinger is virtually a new book for layman and expert alike. For easier references, aircraft are listed alphabetically by manufacturer and model regardless of country of origin. Close to 1,000 aircraft are pictured, representing the majority of aircraft now flying regardless of year of manufacture. Publishers: Hanover House, New York. Price $7.95.

HOW TO HANDLE light twin-engine aircraft under emergency conditions in flight is the subject of a bulletin available without charge from the Office of Information CAA, Washington, D.C. Aviation Safety Release No. 400 points to the increased use of aircraft of this type, and the need of more complete pilot understanding of how to handle the aircraft if one of the two engines fails.

SALE OF SIXTEEN VFH Omni Range Ground Stations to the British Ministry of Transport and Civil Aviation has been announced by Collins Radio Co. Eight of the stations will operate in the United Kingdom, the other eight in various British commonwealths.

EXHAUSTIVE UNDERWATER pressure testing is conducted on this USAF C-130 *Hercules* at Lockheed's Marietta, Ga., plant. Submerged in a 600,000 gallon

water test pool, the aft section of the C-130, including its 38-ft. vertical tail, is subjected to 15 pounds per square inch to prove its structural integrity.

VICTIMIZED by work-bound Detroit traffic which he helped to create, Frederick C. Matthaei, chairman of the board of American Metal Products Co., is solving his personal commuting problem by rising above it in his own Bell helicopter. Flying a three-place Model 47-H, this 63-year-old Detroit business man boards his "whirlybird" six days a week at his farm near Ann Arbor and, 20 minutes later, puts down at the door of his plant in Detroit. He figures his commuting time thusly will be cut 200 hours per year.

AN AF B-47B STRATOJET has been loaned to the Royal Canadian Air Force and, in turn, assigned to Orenda Engines Ltd., Toronto, to be converted into a high altitude test bed for a new Orenda turbojet engine. Canadair, Ltd. will do the conversion for the test flights, which are expected to start later in the year.

WITH THE INTRODUCTION of airborne radar to its DC-7 fleet, American Airlines is educating its passengers and the public with an informative, illustrated pamphlet on the subject of weather radar in commercial aircraft. Eric Sloane, well-known artist, was commissioned to illustrate the booklet.

USAF CHIEF OF STAFF, General Nathan F. Twining personally congratulates Kenneth E. Gehrke of Cleveland, Ohio, for winning the 1955 contest for airplane models of original design. Sponsored by the Dayton Chamber of Commerce, this

annual contest is open to all school youngsters in Ohio. Young Gehrke's model is of a futuristic transport plane, with combination turbo-jet and ram-jet power. Of fiberglass construction its speed was estimated at 2,000 mph and up, at 100,000 ft. altitude.

IN THE BUSINESS of plane making for 25 years, with sales totalling 23,000 aircraft, Grumman has now reversed itself and bought one—a Sikorsky S-55 helicopter. The rotary wing aircraft is assigned to standby rescue service during experimental jet test flights at the company's Peconic River facilities in Long Island.

TWO ORGANIZATIONS of professional pilots have made their introduction to the aviation fraternity—the Society of Experimental Test Pilots, organized at Palmdale, Calif., with J. Ozier as Secretary, and the Society of Industrial Pilots, Inc., at Garden City, N. Y., with W. D. "Jim" Guthrie, well-known in aviation circles, as key man. The test pilot's group has patterned its organization closely after the Inst. of Aeronautical Sciences and is engaged in promoting advancement of flight safety. The industrial group will foster increased safety and efficient operation in business flying.

DELIVERY OF THE FIRST of three twin-engine Piper *Apaches* to be purchased by the Canadian Government is made at the Piper plant to Mr. J. D. Hunter, Superintendent of Flight Operations of

the Canadian Department of Transport. Previous deliveries of *Apaches* for government service have been made to Columbia, S.A., New Zealand, the Belgian Congo, Nigeria and Cuba.

FOLLOWING MORE THAN A YEAR of extensive tests on various component parts and systems, final assembly of Cessna's four-engine Model 620 executive transport prototype is now under way. A 7-10 place aircraft powered by four Continental GSO-526 supercharged and geared engines, it is to be ready for test flight in the near future.

BUSINESSMAN, Denver M. Wright of St. Louis, Mo., is on a solo flying expedition in his Cessna *180* through the West Indies and South American countries. The trip will cover 12,000 miles with 70 scheduled stops. In Brazil and Venezuela, Mr. Wright, a 66-year-old pilot who has logged 1,500 hours since learning to fly in 1948, will include some big game hunting in his schedule.

AIR FREIGHTING automobiles around the world is becoming common place. This Studebaker "Golden Hawk" loading aboard an ASA International Airfreighter is bound for El Salvadore. Studebaker-

Packard officials foresee an increase of 33 per cent in air deliveries to Central America for their products during the coming year.

A SECOND LOOK at some of those funny looking old air mail stamps or commemorative flight covers may mean money in the bank, especially if such stamps show an inverted center. An alert stamp collector recently collected $3,800 for one twenty-four cent aviation stamp with an up-side-down center.



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**AUTOMOBILE DEALER:** Jim Cashman, a General Motors dealer in Las Vegas says, "I couldn't get along without my Cessna 310. It makes possible a lot of business travel which I couldn't undertake any other way. I call it my magic carpet because that's what it really is to me and my business."

**OILMAN:** John Myers, former Lockheed engineering test pilot, says, "I wanted a comparison so I flew the Cessna 310 and others before I made up my mind. The 310 is extremely efficient, easy to handle. Its good power loading gives excellent acceleration, gets me into and out of short fields, easily."

**CONTRACTOR:** Rupert Chisholm's business interests are spread from Southern California to Alaska. Mr. Chisholm covers this territory in his own Cessna 310. "The more I fly it, the more I like it," says Chisholm. "The 310 is faster. Handles easy, too. I looked over a lot of airplanes before I bought my Cessna 310."

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